Advant® OCS
with Master software

Functional Units Part 6
MOTCON VALVECON

User’s Guide

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Chapter 1 Introduction

1.1 General

The function library available in an ABB Advant Controller 400 Series installation includes an extensive range of different data base elements and PC elements. A required control function can be built up with the AMPL language (ABB Master Programming Language).

Functional units are available to supplement the library for more complex functions. The functional unit is a “package” of different program functions (such as PC elements and data base elements).

Each functional unit has a specific communication module for connection to the Operator station (for control and supervision). The operators handling in the Operator Station has a function adapted dialog. Standardized display elements are used for visual indications.

The packaging simplifies documentation and implementation of, for example, functions with both control function and associated operators actions via display screen and keyboard. PC elements and functional units can be used freely together.

Applications include feedback control, sequence control and motor/valve controls.

The functional units are constituted of pre-prepared parts. These consist of different control functions or interfaces to a user designed control function and different operators, alarm and event handling functions.

The descriptions of the functional units for process signal connections, AI, AO, DI, DO include a certain hardware function to give a complete picture of the function. All other functional units are completely implemented in software.

NOTE

General knowledge of the Advant Controller 410/450 and Advant Station 500 Series Operator Station systems is required to fully understand the contents of this manual.

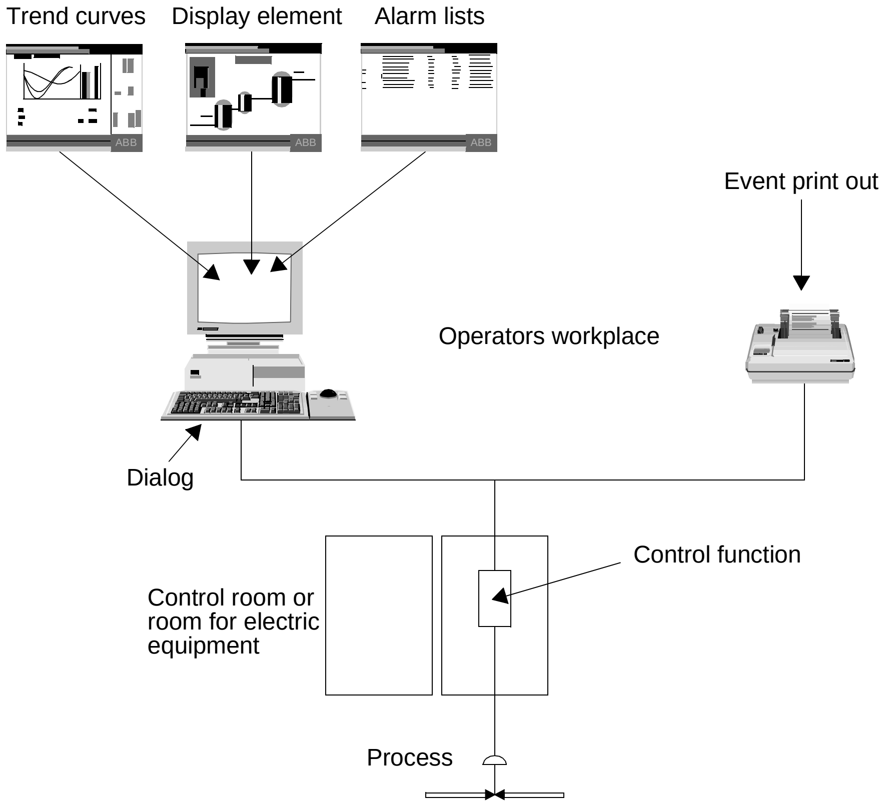


Figure 1-1. Software functions which can be included in a functional unit

1.2 Structure of the Manual

The manual, Functional Units, is for practical reasons divided into seven (7) physical parts. The contents of these seven parts are:

Part 1	Common Properties
Part 2	AI AO DI DO
Part 3	SEQ GROUP
Part 4	PIDCON RATIOSTN MANSTN
Part 5	GENCON GENBIN GENUSD
Part 6	MOTCON VALVECON
Part 7	PIDCONA

Functional Units Part 1 Common Properties, may be read first, in order to define the Functional Unit philosophy. This part also includes descriptions of common properties, valid for all Functional Units.

Part 2 to 7 do not have to be read in part number order. Each part stand by itself (together with part 1). A reader can start with Part 1 and then succeed with the part most urgent.

The contents of the different parts are:

Functional Units Part 1

- General descriptions of the functional units
- Descriptions of common system functions

Functional Units Part 2

- AI (Analog Input). The functional unit AI (Analog Input) incorporates functions for:
  - Scanning of analog and pulse train inputs from the process
  - Filtering, linearization and scaling of such inputs
  - Storage of such inputs or internally calculated analog variables
  - Update blocking and input simulation
  - Limit checking
  - Operator station functions
  - Internal and external alarm detection and handling.
- AO (Analog Output). The functional unit AO (Analog Output) incorporates functions for:
  - Output signal storage and updating
  - Auto and manual modes of control
  - Limit checking prior to storage
  - Scaling and output of an analog control signal to the process
  - Operator station functions.
- DI (Digital Input). The functional unit DI (Digital Input) incorporates functions for:
  - Scanning of digital process inputs.
  - Filtering and inversion of such inputs.
  - Storage of input data
  - Update blocking and input simulation
  - Operator station functions.

- DO (Digital Output). The functional unit DO (Digital Output) incorporates functions for:
  - Output signal storage and updating
  - Auto and Manual modes of control
  - Inversion of stored data prior to output
  - Output of a digital control signal to the process
  - Operator station functions.

Functional Units Part 3

- SEQ (Sequence).
  - SEQ (Sequence) is a software package - a functional unit - designed for universal use in sequence applications.
- GROUP (Group).
  - GROUP (Group) is used for group-start and group-stop of motors, valves and other binary objects coordinated as a group in the process. These objects are normally controlled by MOTCON or VALVECON with which GROUP is compatible.

Functional Units Part 4

- PIDCON
  - PIDCON has been developed for control functions in different processes. It is therefore called a process controller.
- RATIOSTN
  - RATIOSTN is mainly intended for ratio control. This ratio control is performed in cooperation with a process controller PIDCON or PIDCONA.
- MANSTN
  - MANSTN is intended for control of unregulated objects.

Functional Units Part 5

- GENCON
  - GENCON (GENeral object CONtroller) is a general tool which enables the user to create desired control functions. This Functional Unit include a User Defined PC Program.
- GENBIN
  - GENBIN (GENeral object BINary controller) is a general tool which enables the user to create desired control functions. This Functional Unit include a User Defined PC Program.
- GENUSD
  - GENUSD (GENeral object USer Defined controller) is a general tool which enables the user to create desired control functions. This Functional Unit include a User Defined PC Program.

Functional Units Part 6

- MOTCON
  - MOTCON is a functional unit designed for the control of motors in different processes.
- VALVECON
  - VALVECON is a functional unit designed for the control of 2-position valves in different processes.

Functional Units Part 7

- PIDCONA
  - PIDCONA is a complete PID control function with autotuning and adaptive control, including functions for operator interface and event handling.

1.3 Purpose of the Manual

The purpose of this manual is to give the Advant Controller 400 Series implementer information about the powerful library of predefined function units "packages", in order to provide all the information needed for the use of the different functional units.

Functional Units Part 1 contains the following information:

- General descriptions of the functional units
- Descriptions of common system functions

The other six parts include

- Detailed descriptions of the design and function of the different functional units
- Examples of applications

1.4 Other documentation

In addition to the unified documentation for the functional units offered by these series of Function Units Parts (part 1-7), there are other manuals which document individual types of program functions within a functional unit. There is, for example, a reference manual, *PC Elements Advant Controller 400 Series Reference Manual* which embraces all of the PC elements included in the controller. The PC elements contained in any particular functional unit are also included in this. A corresponding manual is available for data base elements, *Data Base Elements Advant Controller 400 Series Reference Manual*. Both are valuable aids for practical use in the day-to-day design work, when knowledge of the function is available. Information in this manual is based on the following documents:

- *PC Elements Advant Controller 400 Series Reference Manual*
- *Data Base Elements Advant Controller 400 Series Reference Manual*
- *AdvaCommand Basic Functions User's Guide*
- *AdvaCommand User Interface Reference Manual*

Chapter 2 MOTCON

MOTCON is a functional unit designed for the control of motors in different processes.

The functional unit is standardized to a high degree to simplify the work of designing presentation, dialog and control logic. The unit has many optional capabilities which increase its operational flexibility. MOTCON normally performs its control function without help from other elements.

MOTCON is used in the control of motors from Advant Station 500 Series Operator Station, control desks or control organs at the motor itself. The motor can be controlled from a master control function (e.g. group start, level regulation from level gauges etc).

2.1 Configuration

MOTCON like other functional units is built up of three parts:

- A PC element which is handled in the same way as other PC elements in the ABB Advant Controller 410/450 range of products.
- A section for operator functions which consists of presentation and order functions. Data and parameters from the process are presented on a Advant Station 500 Series Operator Station. The keyboard of the Advant Station 500 Series Operator Station is used by the operator to enter commands which control the operation of the functional unit. The response to the operator’s intervention is shown on the display screen of the Advant Station 500 Series Operator Station. The application work for this part is normally limited to the arrangement of the display.
- A data base element with configuration constants and dynamic data used by both operator station and PC parts. MOTCON as well as VALVECON utilizes the general data base concept MMCX.

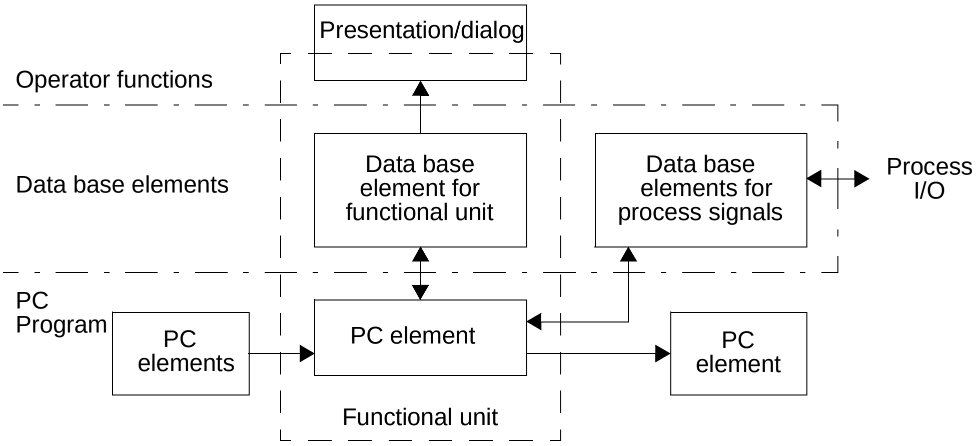


Figure 2-1. The structure of the functional unit

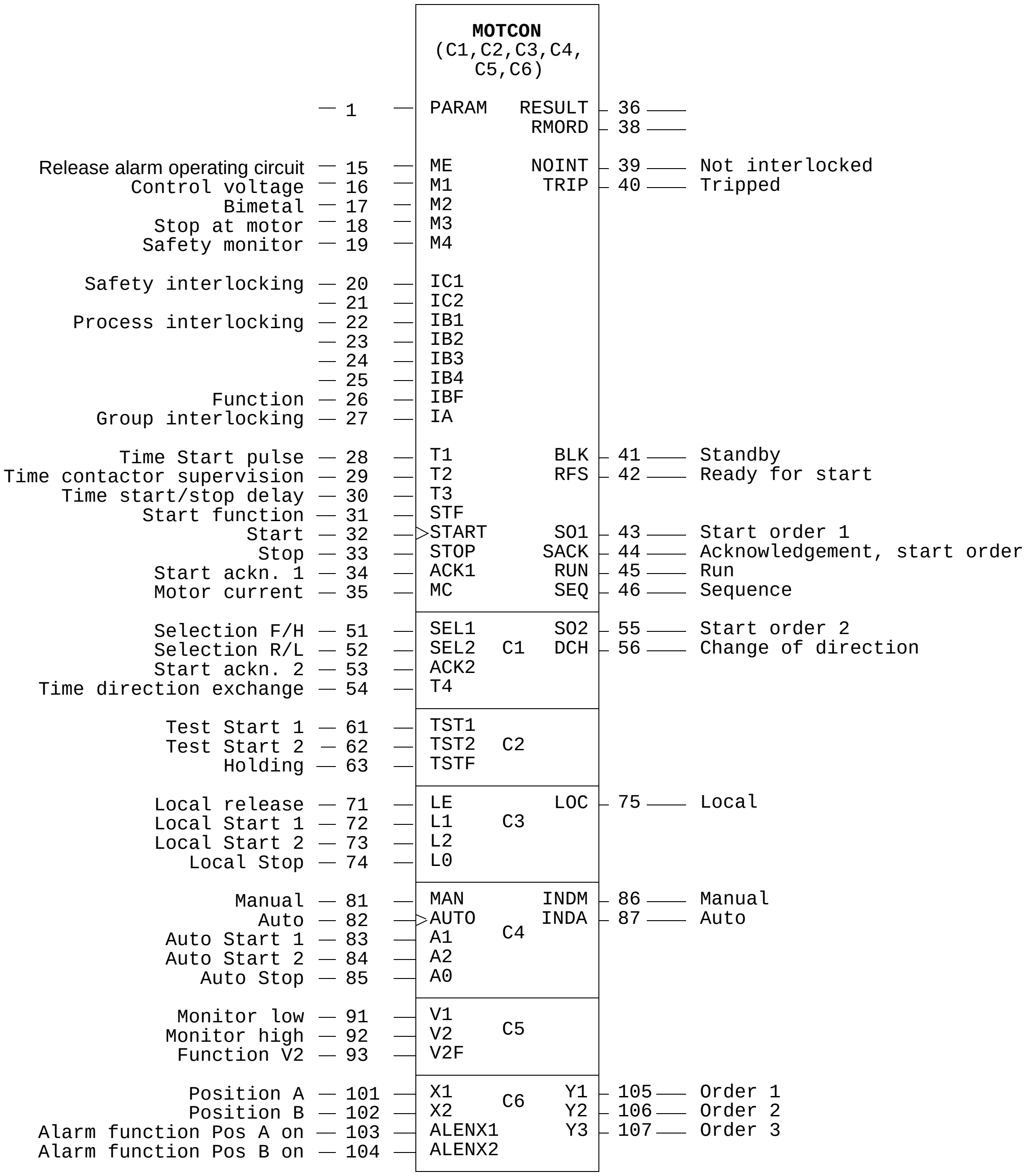


Figure 2-2. PC element, Complete symbol

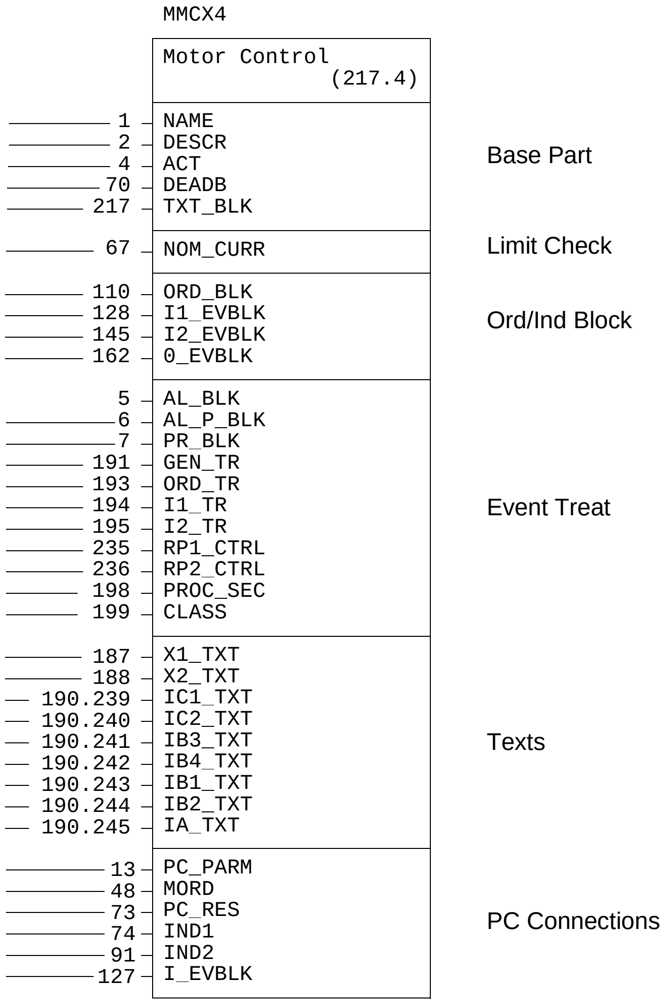


Figure 2-3. Data base element, Complete symbol

2.2 Function

2.2.1 Basic Properties

The MOTCON functional unit is designed for control of motors.

MOTCON units consist of a basic section and six optional additional functions. The basic section includes

- Supervision of control circuits
- Evaluation of interlockings
- Control of on/off
- Supervision of motor current

The following optional functions can be selected:

- Forward/reverse running or selection of High/Low speed
- Running of tests from the motor site
- Control from the local operator’s station
- Manual/Auto running
- Supervision of operations via Advant Station 500 Series Operator Station
- Control and supervision of external functions

Points of Control

MOTCON is intended for control from Advant Station 500 Series Operator Station, i.e. from CENTRAL point of control. However, it is also possible to select other points of control and thus control MOTCON from other locations.

All the points of control can be selected from the central operator station. The LOCAL point of control may also be selected from the local control station.

The different points of control are as follows:

CENTRAL	The motor is controlled from Advant Station 500 Series Operator Station. Control from other locations is blocked
SEQUENCE	The motor is controlled from a superior PC program, e.g. for group start. SEQUENCE is the default point of control. Control from other locations is blocked.
LOCAL	The motor is controlled from a local desk or panel. Control from other locations is blocked.

TEST	The point of control TEST is suitable for testing the motor in the field. The motor is supposed to be controlled from a stop/start station adjacent to the motor. Control from other locations is blocked.
STANDBY	The motor is stopped and all orders to it are blocked.

Control Modes

MOTCON supports the control modes MAN and AUTO.

MAN	In the MANual control mode, the motor may be started directly from the selected point of control, provided that the motor is ready for start
AUTO	In the AUTOmatic control mode, the process controls the motor by way of a PC program. This mode is e.g. used for on/off control of levels and for automatic startup and shutdown of belt conveyors.

Ready for Start

Ready for start means that all the interlocks are satisfied, that there are no alarms and that the point of control is not STANDBY.

Ready for start is indicated by the MOTCON displays in the Advant Station 500 Series Operator Station and by the PC output terminal :RFS (Ready For Start).

Start-up

An initialization phase begins at start of the system. The result of this becomes:

- The outputs are reset (to zero) except for the SEQ terminal which is set (to 1). This is also performed when the PC program is deblocked.

  SEQ is the default point of control at system initialization. With an additional circuit it is possible to force the point of control to CENTRAL at system initialization. Please refer to Section 2.6.4 Example 4.
- Elements in the data base connected from PC elements are reset. Status indications for fault status and repeated fault are removed.

2.2.2 Interlockings

The motor control can be interlocked by signals from the process and also by signals from the PC logic. The interlockings are divided into three groups with the following designations and functions.

- C-interlockings which interlock the object for safety purposes. The two safety interlockings, IC1 and IC2, cannot be blocked.
- B-interlockings. There can be 4 normal process interlockings, IB1-IB4. The interlockings IB1 and IB3 can be blocked by the operator. If the parameter IBF is set to 1 (TRUE), IB3 and IB4 function as start interlockings. A start interlocking prevents the motor from starting, but does not stop a running motor.
- A-interlocking. This interlocking is used if the object is to be interlocked against other objects such as a pump motor or a group start or other conditions in an automatic sequence. The interlocking cannot be blocked and the interlocking is not included in the conditions for indication of Ready for start.

An interlocking is active when the PC-input is 0 (FALSE). All A and B interlockings are blocked when the TEST point of control is selected.

2.2.3 Points of Control

By selecting point of control, the operator decides from which location the motor is to be controlled. All points of control may be selected through dialog in Advant Station 500 Series Operator Station. However, the LOCAL point of control may also be selected from the local control station through the PC element input :LE, provided that the current point of control is neither TEST, nor STANDBY.

From the different points of control,MOTCON is controlled as follows. For a summary of the points of control, see Table 2-1.

CENTRAL

The motor is controlled from Advant Station 500 Series Operator Station. Control from other locations is blocked.

Control mode MAN

The operator controls the motor from Advant Station 500 Series Operator Station. To start, the operator has to press the keys START followed by SEND. To stop the motor, the key STOP has to be pressed.

Control mode AUTO

The process controls the motor through the PC inputs :A1/ :A2/ :A0. To enable :A1 and :A2 to start the motor for the first time, the operator must release :A1/ :A2/ :A0 by issuing a start command from Advant Station 500 Series Operator Station (see Section 2.2.4 Control Modes). The operator is able to stop the motor by issuing stop order from Advant Station 500 Series Operator Station.

SEQUENCE

The motor is controlled from a superior PC program, e.g. for group start. SEQUENCE is the default point of control. Control from other locations is blocked.

Control mode MAN

A superior PC program controls the motor through the PC inputs :START and :STOP. When several MOTCON instances are used, the superior PC program may use control mode MAN to enable/prevent operation of several motors. This PC program then switches the control mode of MOTCON to AUTO (by setting the PC input :AUTO high) when the local process is to take over control of the motor.

Control mode AUTO

The process controls the motor through the PC inputs :A1/ :A2/ :A0. To enable :A1/ :A2 to start the motor for the first time, the superior PC program must release :A1/ :A2/ :A0 by applying a start order to the PC input :START (see Section 2.2.4 Control Modes).

The superior PC program is able to stop the motor by issuing stop order to the PC input :STOP. The operator is also able to stop the motor by issuing stop order from Advant Station 500 Series Operator Station.

The PC inputs used for start and stop orders in control mode MAN are:

:STOP	Stop order (active low)
:START	Start order

The function of these PC inputs is set out in tabular form below:

:STOP	:START	
0	X	Stop order
1	0 -> 1	Start order

:START is a dynamic input, i.e. it triggers on the rising edge.

LOCAL

The motor is controlled from a local desk or panel. Control from other locations is blocked. LOCAL point of control, like other points of control, may be selected from Advant Station 500 Series Operator Station. In addition, LOCAL point of control may be selected from the local control panel through the PC input :LE as follows:

LE = 1: The point of control is LOCAL, as long as the Advant Station 500 Series Operator Station operator does not request TEST or STAND BY.

LE -> 0: MOTCON resumes the latest point of control called for from Advant Station 500 Series Operator Station.

Control mode MAN

The operator controls the motor through the PC inputs :L1/ :L2/ :L0.

Control mode AUTO

The process controls the motor through the PC inputs :A1/ :A2/ :A0. To enable :A1/ :A2 to start the motor for the first time, the operator must release :A1/ :A2/ :A0 by applying a start order to either of the PC inputs :L1 or :L2 (see Section 2.2.4 Control Modes). The operator is able to stop the motor by issuing stop order to the PC input :L0.

The PC inputs used for start and stop orders in control mode MAN are

:L0	Local stop order (active low)
:L1	Local start order 1, Forward/High
:L2	Local start order 2, Reverse/Low

The function of these PC inputs is set out in tabular form below.

:L0	:L1	:L2	
0	X	X	Stop order. Note In order for the motor to start when L0 has been low, L0 must be set high and either L1 or L2 must make a low-to-high transition
1	0	0	No change
1	1	0	Start order 1, Forward/High
1	0	1	Start order 2, Reverse/Low
1	1	1	No change. Setting both L1 and L2 high simultaneously is equivalent to Start order 1

TEST

The motor is controlled from a stop/start station adjacent to the motor. The supervision of interlocks is limited. Only the safety interlocks IC1 and IC2 as well as faults in the control voltage chain (the PC inputs :M1 - :M4) prevent starting. Control from other locations is blocked.

The control modes MAN and AUTO are not available in point of control TEST. The motor is started and stopped through the PC inputs :TST1 and :TST2.

The PC inputs used for start and stop orders are

:TST1	Start order 1 from field-mounted start/stop station
:TST2	Start order 2 from field-mounted start/stop station
:TSTF	Start function from field-mounted start/stop station

The function of these inputs is set out in tabular form below.

1. :TSTF=0

:TST1	:TST2	
0	0	Stop order.
1	0	Start order 1, Forward/High.
0	1	Stop order 2, Reverse/Low.
1	1	No change. Setting both TST1 and TST2 high is equivalent to Start order 1.

2. :TSTF=1

:TST1	:TST2	
0	0	No change.
1	0	Start order 1, Forward/High.
0	1	Stop order 2, Reverse/Low.
1	1	No change. Setting both TST1 and TST2 high simultaneously is equivalent to Start order 1 .

When :TSTF=1, the motor is stopped by breaking the control voltage chain, i.e. signified by any of the :M1 - :M4 inputs going low.

STANDBY

The motor is stopped and all orders to it are blocked.

2.2.4 Control Modes

MOTCON supports the control modes MAN and AUTO, but only when the point of control is CENTRAL, SEQUENCE or LOCAL. Control mode may be selected by dialog in Advant Station 500 Series Operator Station or through the PC inputs :MAN and :AUTO. The latest order applies, with one exception: When the PC input :MAN is set high, AUTO cannot be selected by dialog.

The following table sets out the function of the PC inputs :MAN and :AUTO:

:MAN	:AUTO	
0	0	No change (Results in MAN at start-up).
1	X	Manual mode requested
0	0 -> 1	Automatic mode requested
1 -> 0	1	Manual mode still requested

Control mode MAN

In MAN mode, the motor may be started directly from the current point of control, provided that the motor is ready for start.

Control mode AUTO

In AUTO, the process controls the motor through the PC inputs of MOTCON, as follows:

:A1	AUTO start order 1, Forwards/High
:A2	AUTO start order 2, Reverse/Low
:A0	AUTO stop order (active low)

If the motor stands still when AUTO is selected, the inputs :A1/ :A2/ :A0 do not engage immediately. To enable those inputs, they must be released. That is done by issuing a start order in the same way as in MAN mode. This means that the inputs :A1/ :A2/ :A0 are released in the following ways from the different points of control:

CENTRAL	Start order from Advant Station 500 Series Operator Station	
SEQUENCE	PC input:	:START -> 1
LOCAL	PC input:	:L1/ :L2 -> 1

(See Section 2.2.3 Points of Control)

When AUTO is released in this way, MOTCON assumes operation status ‘autostart’. ‘Autostart’ means that the inputs :A1/ :A2/ :A0 are enabled, but the motor still is stopped. The object display of MOTCON indicates autostart by the field for operation status being half filled. When :A1/ :A2 then starts the motor, the field for opera-tion status fills up completely (See Section 2.5 Operator Station Functions).

If the motor is running when AUTO is selected, the inputs :A1/ :A2/ :A0 are enabled immediately.

Below, the function of the inputs :A1/ :A2/ :A0 is set out in tabular form. In contrast to other stop order inputs, :A0 has a lower priority than the start order inputs (:A1 and :A2).
This means that

- When :A1/ :A2 sense a pulsed signal, :A0 must be high (1)
- When :A1/ :A2 sense a continuous signal, :A0 must be low (0)

:A0	:A1	:A2	
0	0	0	Stop order.
1	0	0	No change
X	1	0	Start order 1, Forwards/High
X	0	1	Start order 2, Reverse/Low
X	1	1	No change. Setting both :A1 and :A2 high simultaneously is equivalent to Start order 1

2.2.5 Start and Stop Order at Different Points of Control and Control Modes

The table below describes the commands which can be given at the different control modes and points of control of MOTCON.

Table 2-1. Relation between commands and control modes and points of control

Order	**Central Man**	**Central Auto**	**Sequence Man**	**Sequence Auto**	**Local Man**	**Local Auto**	**Test**
Operator start	Start	Release Auto	–	–	–	–	–
Operator stop	Stop	Stop	Stop	Stop	–	–	–
PC input START	–	–	Start	Release Auto	–	–	–
PC input STOP	–	–	Stop	Stop	–	–	–
PC input L1	–	–	–	–	Start	Release Auto	–
PC input L0	–	–	–	–	Stop	Stop	–
PC input A1	–	Start	–	Start	–	Start	–
PC input A0	–	Stop	–	Stop	–	Stop	–
PC input TST1	–	–	–	–	–	–	Start Stop

2.2.6 Start and Stop

Start and stop commands for MOTCON may originate from dialog with Advant Station 500 Series Operator Station or from PC inputs, depending on the point of control selected (See Section 2.2.3 Points of Control, and Table 2-1).

When a start command is issued to MOTCON, it is forwarded to the motor through the PC output :SO1 (Start order 1, Forwards/ High) or :SO2 (Start order 2, Reverse/Low). See Section 2.2.7 Start Order Selection. The start order on the output :SO1/ :SO2 is a pulse with a duration which is determined by the PC input :T1.

The main contactor of the motor acknowledges the start order :SO1/ :SO2 by setting the PC input :ACK1/ :ACK2 high. The main contactor must acknowledge within the time determined by the PC input :T2. The time T2 ought to be set longer than T1.

If the main contactor acknowledges the start order pulse :SO1/ :SO2 within the time T2, MOTCON sets the start order output :SO1/ :SO2 high and keeps it high. The time T3 after the main contactor having responded, MOTCON starts supervising the motor current. The time T3 is determined by the PC input :T3.

If the main contactor does not acknowledge the start order within the time T2, the start attempt is deemed abortive. Consequently, MOTCON issues an alarm about the contactor failure and a new attempt at starting may be made.

The contactor failure alarm indication on the object display of MOTCON disappears when the operator acknowledges the alarm.

MOTCON also issues an alarm about main contactor failure when the contactor acknowledges start orders falsely, i.e. when it sets the PC inputs :ACK1/ :ACK2 high without any start order being issued. MOTCON transmits the alarm the time T2 after the input having been set.

2.2.7 Start Order Selection

The PC element MOTCON has two start order outputs:

:SO1	Start order 1, Forwards/High
:SO2	Start order 2, Reverse/Low

Which order output to activate is determined as follows from the different points of control. See also Section 2.2.3 Points of Control.

Point of control CENTRAL

Control mode MAN

The operator issues a Forwards/Reverse order from Advant Station 500 Series Operator Station prior to issuing a new start order (However, the PC inputs :SEL1 and :SEL2 have a higher priority).

Control mode AUTO

PC inputs :A1/ :A2

Point of control SEQUENCE

Control mode MAN

The superior PC program sets the inputs :SEL1/ :SEL2 high prior to issuing a new start order. See the table below.

:SEL1	:SEL2	
0	0	No change.
1	0	Start order 1 selected
0	1	Start order 2 selected
1	1	SEL1 was set first: Start order 1 selected
1	1	SEL2 was set first: Start order 2 selected

Control mode AUTO

PC inputs :A1/ :A2

Point of control LOCAL

Control mode MAN

PC inputs :L1/ :L2

Control mode AUTO

PC inputs :A1/ :A2

Point of control TEST

PC inputs :TST1/ :TST2

Point of control STANDBY

The motor cannot be started.

2.2.8 Change of Direction

The motor is ordered to reverse or change speed by the issue of a new order on the complementary start order output. This order can only be issued from the point of control selected. See Section 2.2.3 Points of Control, and Section 2.2.7 Start Order Selection.

When the motor is requested to reverse, both start order outputs are blocked. After a time which is determined by the PC input :T4, MOTCON forwards the new start order on either :SO1 or :SO2. This start order is a pulse with the length T1 (see Section 2.2.6 Start and Stop).

During the time T4, i.e. when the motor is stopped, MOTCON sets the PC output DCH (Direction CHange) high. This is also indicated in the display elements by a flashing direction symbol.

2.2.9 Fault Evaluation in the Control Circuit

Evaluation is performed in the priority order M1 to M4. This means that if the PC input :M1=0, the inputs :M2 - :M4 are not regarded etc. The signal ME interlocks the complete evaluation. ME=0 is used to prevent incorrect alarms with, for example, a total control voltage failure. The inputs M1 to M4 are to be TRUE when there are no errors. The evaluation presupposes that the control circuit consists of a number of breaking contacts in series. Alarm handling of M1 to M4 is blocked internally in the PC-element with the motor at standstill.

2.2.10 Operation Monitors

The inputs V1 and V2 are intended for connection to operation monitors to obtain tripping or alarm in the event of faults. The inputs are to be TRUE when the equipment is faultless. In order to allow the motor to reach operational speed, V1 and V2 are blocked during the time T3 after start-up. When the TEST point of control is selected, V1 and V2 are blocked. When V1 or V2 goes to 0, MOTCON remembers this error status until the alarm is acknowledged. V1 has a motor tripping function whereas the V2 function can be controlled with the input V2F. When V2F = TRUE, the motor is tripped. With V2F = FALSE, only an alarm is given. Alarm handling of V1 and V2 is blocked internally in the PC element with the motor at standstill.

2.2.11 Supervision of Motor Current

The input MC is connected to the process signal for motor current. In the data base element MOTCON, the value which corresponds to 100 % load (rated current) is given for the property NOM_CURR. The motor current is compared with NOM_CURR and an indication is obtained if the current is greater than 100 %. During start up, the comparison is blocked during the time T3. The value presented on the display screen is given as a percentage of the rated current (rated current = 100 %).

2.2.12 Control and Supervision of External Functions

Three outputs Y1, Y2 and Y3 which can be set from a dialog are used for control of functions associated with the motor. Note that the orders are pulsed, i.e. they are set to 1 only during one execution interval. The two inputs X1 and X2 can be used for indication or alarms for signals such as limits switches. The indications are presented in object displays together with the text specified at the inputs X1_TXT and X2_TXT of the data base element. The inputs ALENX1 and ALENX2 give an alarm from X1 and X2 respectively if they are set to TRUE, otherwise only an indication is obtained.

2.2.13 Alarm Handling

The alarm handling for MOTCON can, via the data base element, be controlled individually for the different types of fault which can develop. For example, it is possible to block the alarms for one or more of the monitorings in the control voltage chain M1 to M4. Suitable values are to be set at the inputs I1_EVBLK and I2_EVBLK if this blocking is to be permanent. If a dynamic blocking of certain alarms is necessary because of the requirements of the point of control, it is possible to create in PC a suitable value and connect this to the inputs of the data base element.

Note however that the PC-element itself blocks certain alarms in a number of situations. For example, M1 to M4 and V1 and V2 are blocked with the motor at standstill. The alarm reporting from X1 and X2 must be controlled by the PC inputs ALENX1 and ALENX2 and not by the database element.

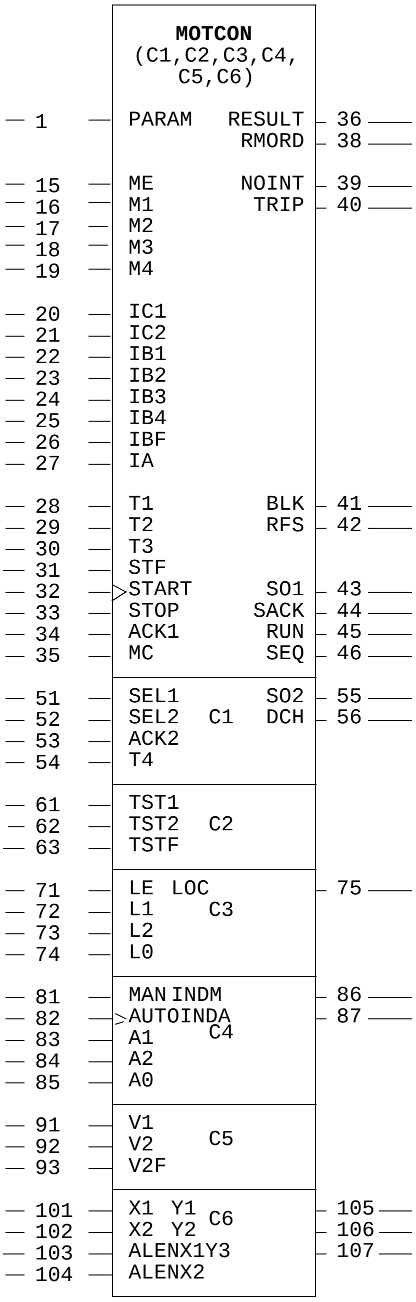
2.3 PC Element MOTCON

The information about the PC element in the functional unit MOTCON, its extension with call parameters and its connection description are given mainly in data sheet form. This data sheet is included in the manual *PC Elements Advant Controller 400 Series Reference Manual* in which all of the PC-elements included in the Advant Controller 410/450 products are assembled.

Motor Control MOTCON

Summary

The PC element MOTCON forms part of the functional unit MOTCON (MOTor CONtroller). The element is used with the data base element MOTCON for controlling motors.



PC element MOTCON

Call MOTCON (C1, C2, C3, C4, C5, C6)

The element consists of one basic part which gives a complete motor controller in its basic form. This part may be complemented by optional extra functions with the call parameters C1–C6.

Parameter	Significance	Permissible values
C1	Selection of forward/backward (high/low) function.	0 .. 1
C2	Selection of test run function.	0 .. 1
C3	Selection of function for control from a local control panel.	0 .. 1
C4	Selection of auto function (e.g. run between limit positions).	0 .. 1
C5	Selection of function for start interlocked sensors.	0 .. 1
C6	Selection of function for external indication/alarm and external control via operator dialog.	0 .. 1

Terminal Description

No	Name	Type	Description
1	PARAM	IA32	**PARAM**eter. Parameters from the object data base element MOTCON.
15	ME	IB	**M** circuit supervision **E**nable. Input for enabling alarm from control circuit.
16	M1	IB	Input for control voltage.
17	M2	IB	Input for bimetal relay.
18	M3	IB	Input for stop from motor location.
19	M4	IB	Input for safety supervision.
20	IC1	IB	**I**nterlock **C1**. Operation interlock (not deblockable).
21	IC2	IB	**I**nterlock **C2**. Operation interlock (not deblockable).
22	IB1	IB	**I**nterlock **B1**. Operation interlock (1) (2).
23	IB2	IB	**I**nterlock **B2**. Operation interlock(2).
24	IB3	IB	**I**nterlock **B3**. Start/operation interlock(1)(2).
25	IB4	IB	**I**nterlock **B4**. Start/operation interlock(2).
26	IBF	IB	**I**nterlock **B F**unction. Control input for IB3 and IB4. If IBF is set to 1, IB3 and IB4 work as start interlocks.
27	IA	IB	**I**nterlock A. Operation interlock(2).
28	T1	IT	**T**ime **1**. Input for pulse time for start order.
29	T2	IT	**T**ime **2**. Input for maximum delay time of contactor response.
30	T3	IT	**T**ime **3**. Input for time for delayed activation of V1 and V2. (This presupposes that call parameter C5=1.)
31	STF	IB	**ST**art **F**unction. Input for control function for direction change. Set STF=1. STF=0 is not implemented.
32	START	IB	Input for start order.

Terminal Description

No	Name	Type	Description
33	STOP	IB	Input for stop order. STOP=0 causes stop.
34	ACK1	IB	**ACK**nowledge **1**. Input for acknowledgement of SO1 (start acknowledgement).
35	MC	IR	**M**otor **C**urrent. Input for motor current.
36	RESULT	OA12	Output for results to the data base element MOTCON.
38	RMORD	OI	**R**eset **M**anual **ORD**er. Output for clearing activation order in the object data base element MOTCON.
39	NOINT	OB	**NO INT**erlock. Output which is set to 1 when the object is not interlocked and no remaining or unacknowledged faults exist.
40	TRIP	OB	Output which indicates an error in a control circuit, tripped supervision (V1, V2), contactor fault or external alarm (X1, X2).
41	BLK	OB	**BL**oc**K**ed. Output which is set to 1 when the point of control is STANDBY.
42	RFS	OB	**R**eady **F**or **S**tart. Output which is set to 1 when IC1zIC2 and IB1zIB4 are all 1 and (when the object is not in operation mode TEST) there are no unacknowledged or remaining faults.
43	SO1	OB	**S**tart **O**rder **1**. Output to contactor.
44	SACK	OB	**S**tart **ACK**nowledge. Output which indicates that the object has been started and the alarm is activated.
45	RUN	OB	Output for operation acknowledgement. (SO1 and ACK1 are set to 1.)
46	SEQ	OB	**SEQ**uence. Indication of point of control SEQUENCE.
51(3)	SEL1	IB	**SEL**ect start order **1**. Preselection of start order 1.(Does start the object.)
52(3)	SEL2	IB	**SEL**ect start order **2**. Preselection of start order 2. (Does not start the object.)
53(3)	ACK2	IB	**ACK**nowledge **2**. Input for acknowledgement of SO2 (start acknowledgement).
54(3)	T4	IT	**T**ime **4**. Input for minimum time for switching start orders (Change of direction).
55(3)	SO2	OB	**S**tart **O**rder **2**. Output to contactor.
56(3)	DCH	OB	**D**irection **CH**ange. Output which, when set to 1, indicates that a change of start order is in progress.
61(3)	TST1	IB	**T**est **ST**art **1**. Input for start order 1 from motor location.
62(3)	TST2	IB	**T**est **ST**art **2**. Input for start order 2 from motor location.
63(3)	TSTF	IB	**T**est **ST**art **F**unction. Input for self locking for TST1 and TST2. Self locking is obtained when TSTF is set to 1.
71(3)	LE	IB	**L**ocal **E**nable. Input for selection of point of control LOCAL.
72(3)	L1	IB	**L**ocal start order **1**. Input for local start order 1.
73(3)	L2	IB	**L**ocal start order **2**. Input for local start order 2.
74(3)	L0	IB	**L**ocal stop order. Input for local stop order. L0 is active low.

Terminal Description

No	Name	Type	Description
75(3)	LOC	OB	**LOC**al. Indication of point of control LOCAL.
81(3)	MAN<	IB	**MAN**ual. Input for switching to control mode MANUAL.
82(3)	AUTO	IB	**AUTO**matic. Input for switching to control mode AUTO. Enables the inputs A1, A2 and A0. Dynamic input.
83(3)	A1	IB	**A**uto **1**. Input for auto start order 1.
84(3)	A2	IB	**A**uto **2**. Input for auto start order 2.
85(3)	A0	IB	**A**uto **0**. Input for auto stop order 0.
86(3)	INDM	OB	**IND**ication **M**anual. Output for indication of control mode MANUAL.
87(3)	INDA	OB	**IND**ication **A**uto. Output for indication of control mode AUTO.
91(3)	V1	IB	Input for tripping (active low), to be connected to an operation monitor. The input is disabled for time T3 after start.
92(3)	V2	IB	Input for tripping (active low), to be connected to an operation monitor. The input is disabled for time T3 after start. It is further required that the input V2F is set to 1 for tripping to be possible.
93(3)	V2F	IB	**V2 F**unction. Input which must be set to 1 if tripping of V2 is to be possible.
101(3)	X1	IB	E**X**ternal alarm/indication **1**. Input for external alarm/indication. (IND107.)
102(3)	X2	IB	E**X**ternal alarm/indication **2**. Input for external alarm/indication. (IND111.)
103(3)	ALENX1	IB	**AL**arm **EN**able **X1**. Input which, when set to 1, gives alarm function at X1.
104(3)	ALENX2	IB	**AL**arm **EN**able **X2**. Input which, when set to 1, gives alarm function at X2.
105(3)	Y1	OB	Output controllable from dialog.
106(3)	Y2	OB	Output controllable from dialog.
107(3)	Y3	OB	Output controllable from dialog.

(1) May be disabled via operator dialog.
(2) Disabled in operation mode TEST.
(3) These terminals are selected with the call parameters C1-C6 respectively

2.3.1 Connections to Data Base Elements

The PC element MOTCON is intended for connection to the data base element MOTCON. The following connections are made in the PC Program to transmit information between the PC element and the data base element.

Table 2-2. Connections to data base elements

No	Name	Terminals in the data base element
1	PARAM	PC_PARM
36	RESULT	PC_RES
38	RMORD	MORD

Data base terminal PC_PARM

PC_PARM is a block term which transfers operator’s orders and rated current to the PC element. It consists of the following orders.

Table 2-3. Operator’s orders from the data base element PC_PARM

Name	Use
MORD_00	Point of control switch-over to LOCAL
MORD_01	Point of control switch-over to TEST
MORD_02	Point of control switch-over to STANDBY
MORD_03	Point of control switch-over to CENTRAL
MORD_04	Control mode switch-over to AUTO
MORD_05	Control mode switch-over to MAN
MORD_06	Blocking of interlocking IB1 and IB3
MORD_07	Deblocking of interlocks
MORD_08	Preselection of start-order 1 (Does not give start) (Forw/High)
MORD_09	Preselection of start-order 2 (Does not give start) (Rev/Low)
MORD_10	Start order
MORD_11	Stop order
MORD_12	Y1 (Control of external logic)
MORD_13	Y2 (Control of external logic)
MORD_14	Y3 (Control of external logic)
MORD_15	Point of control switch-over to SEQUENCE
REAL_RES_HILIM	Limit for motor current (rated current)

Data base terminal PC_RES

PC_RES is a block term in which indications and current motor current are stored. It consists of the terminals IND1 and IND2 and motor current calculated as a % of the rated current. IND1 and IND 2 each consist of 16 indications.

Table 2-4. Operator's orders from the data base element PC_RES

Name	Use
IND1_00	Control voltage fault
IND1_01	Bimetal relay fault
IND1_02	Local stop
IND1_03	Safety monitor
IND1_04	Contactor fault
IND1_05	Monitor V1 tripped (Monitor low)
IND1_06	Monitor V2 tripped (Monitor high)
IND1_07	X1 external indication/alarm (Position A)
IND1_08	Collective fault indication
IND1_09	Collective unacknowledged fault indication
IND1_10	High motor current
IND1_11	X2 external indication/alarm (Position B)
IND1_12	Run
IND1_13	Preselected start order 1
IND1_14	Preselected start order 2
IND1_15	Exchange of start order in progress
IND2_00	Blocked IB1 and IB3
IND2_01	Point of control LOCAL
IND2_02	Point of control TEST
IND2_03	Point of control STANDBY
IND2_04	Point of control SEQUENCE
IND2_05	Control mode AUTO=1/MANUAL=0
IND2_06	Started in AUTO
IND2_07	Ready to run
IND2_08	Active interlocking IC1
IND2_09	Active interlocking IC2
IND2_10	Active interlocking IB3

Table 2-4. Operator’s orders from the data base element PC_RES

Name	Use
IND2_11	Active interlocking IB4
IND2_12	Active interlocking IB1
IND2_13	Active interlocking IB2
IND2_14	Active interlocking IA
IND2_15	Block. B-interlocking active
REAL_RES	Motor current as a % of rated current

Data base terminal MORD

The PC element terminal RMORD resets the terminal MORD in the MOTCON data base element. This means that an order from operator is reset when it is read and executed by the PC element.

2.4 Data Base Element MOTCON

Information about the data base element in the functional unit MOTCON is given in data sheet form. This data sheet is included in the manual *Data Base Elements Advant Controller 400 Series Reference Manual* in which all of the data base elements included in the Advant Controller 410/450 products are assembled.

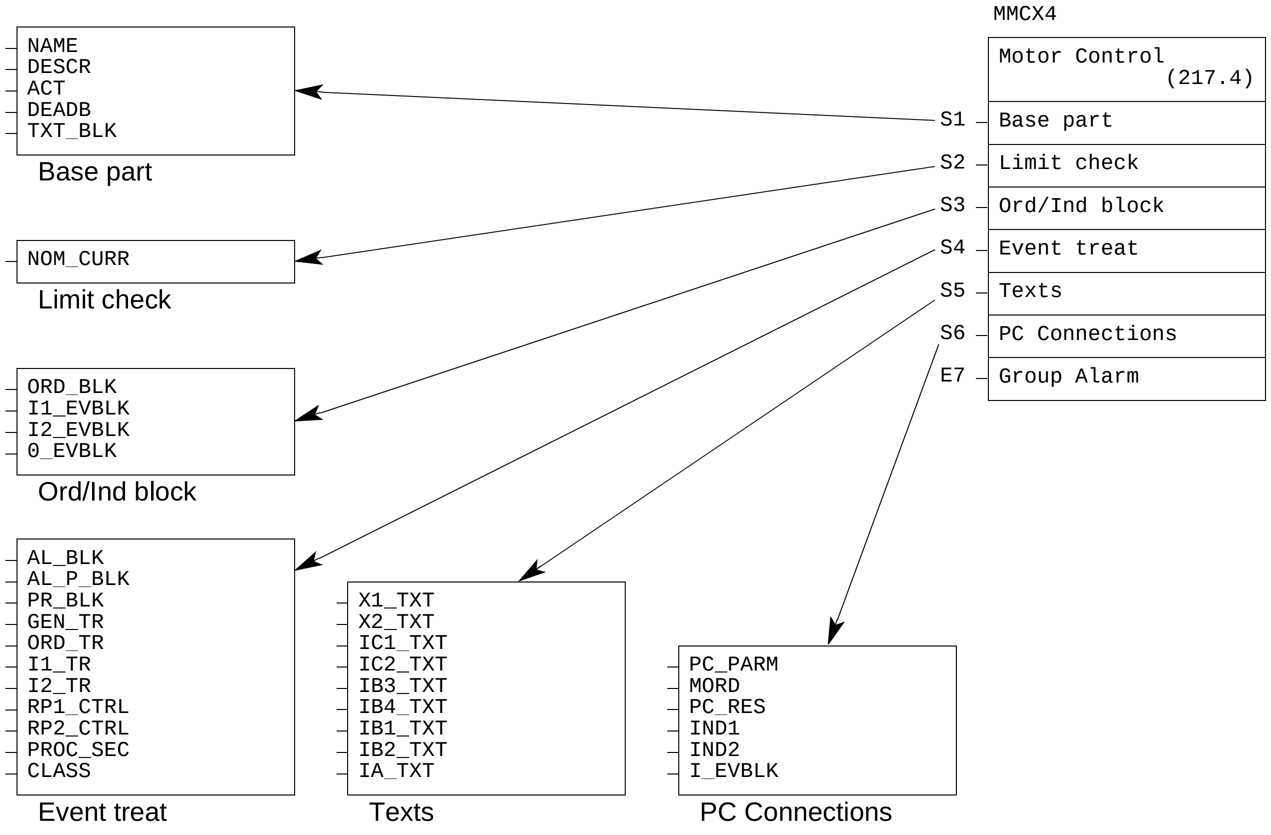
Motor Control MOTCON

Summary

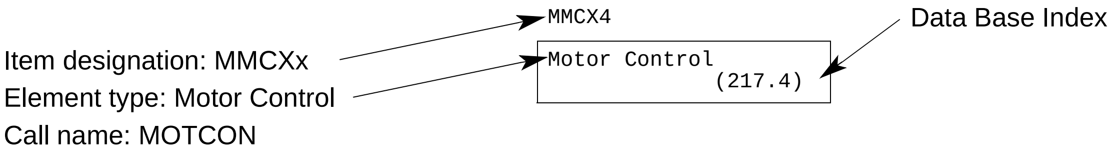
The Motor Control data base element is used to build Advant Station 500 Series Operator Station functions for the MOTCON function unit. Some static information is given. For information about the extension parts of Group Alarm see data base element Group Member.

Parameters that can be changed from the dialog can be given start values.

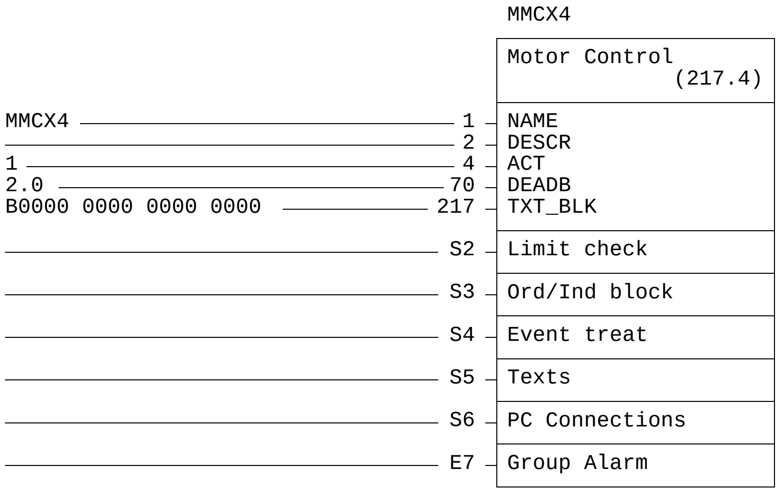
Overview



Head



Base part



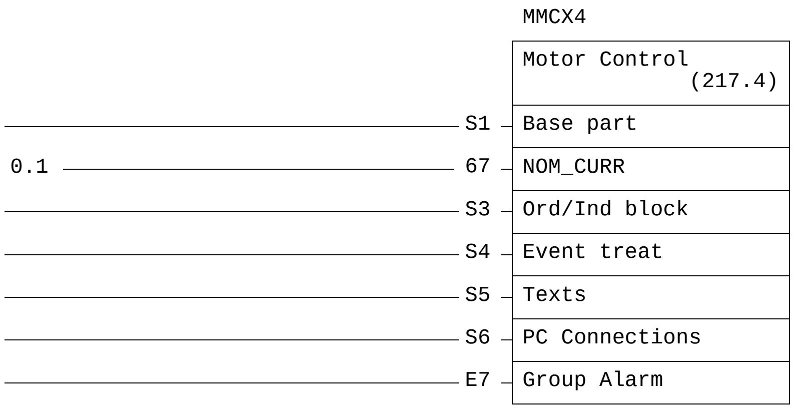
Terminal Description, Base part

Terminal No	Terminal Name	Value entered by	Default value	PC connection data type	Description	Remarks
1	NAME	user	MMCXx	–	Each object must be given a unique **NAME**. E.g. ABC 123.	Max. 20 characters. Spaces are not allowed.
2	DESCR	user	–	–	**DESCR**iption of the object that is shown in Operator Station.	Max. 20 characters. Any information regarding the object may be entered.
4	ACT	user	1	B(r/w)	1=operator communication is **ACT**ive.	0=dialog is blocked and events are not updated.
70	DEADB	user	2.0	–	**DEADB**and limit percentage. If change in current exceeds the limit, the value will be updated.	–

Terminal Description, Base part (Continued)

Termi-nal No	**Terminal Name**	**Value entered by**	**Default value**	**PC con-nection data type**	**Description**	**Remarks**		
217	TXT_BLK	user	H’0	I(r/w)	**T**e**XT BL**oc**K** is used to remove unused fixed error texts from the object picture. All available texts are represented by a flag in TXT_BLK. A set flag indicates a blocked text. The default value have no set flags. The TXT_BLK table shows how to compute the TXT_BLK value. New values can be entered as hexadecimal string, e.g. H'0000 or as a binary string, e.g. B0000 0000 0000 0000.	Text	Bit value	Def. Hex. value
						Control voltage	1	0
						Bimetal relay	2	
						Local stop	4	
						Safety Monitor	8	
						Not used	1	0
						Monitor high	2	
						Monitor low	4	
						Not used	8	
						Not used	1	0
						Not used	2	
						Not used	4	
						Not used	8	
						Not used	1	0
						Not used	2	
						Not used	4	
						Not used	8	

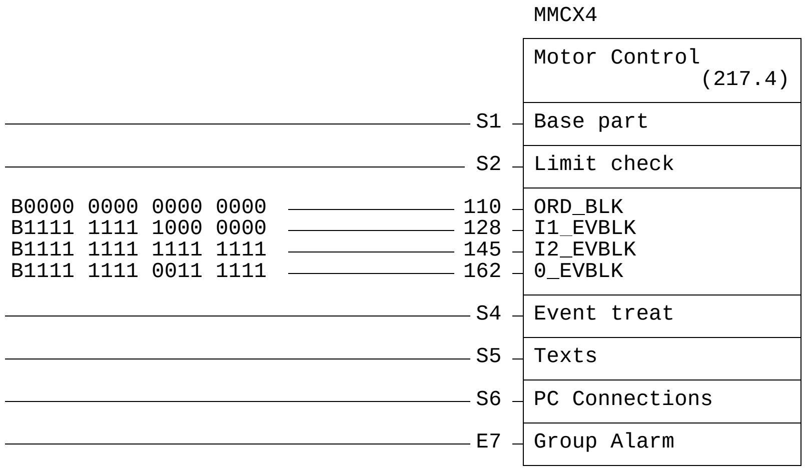
Limit check



Terminal Description, Limit check

Terminal No	Terminal Name	Value entered by	Default value	PC connection data type	Description	Remarks
67	NOM_CURR	user	0.1	R(r)	The **NOM**inal **CURR**ent of the motor expressed in amperes. This value is used for limit check of motor current. It is also used for scaling of motor current in which case it equals 100%.	One decimal only will be displayed in Operator Station. (0.1..9999.9).

Ord/Ind block



Terminal Description, Ord/Ind block

Termi-nal No	Terminal Name	Value entered by	Default value	PC con-nection data type	Description	Remarks		
						Text	Bit value	Def. Hex. value
110	ORD_BLK	user	H’0000	I(r/w)	**BL**oc**K**ing of manual **ORD**ers. All available orders are represented by a flag in ORD_BLK. A set flag indicates a blocked order. The default value contains no set flags. The ORD BLK table shows how to compute the ORD BLK value. New value can be entered as a hexadecimal string, e.g. H'0000, or as a binary string, e.g. B0000 0000 0000 0000.	Local	1	0
						Test	2	
						Standby	4	
						Central	8	
						Auto	1	0
						Man	2	
						Blocking of interlocks IB1 and IB3	4	
						Deblocking of interlocks	8	
						Forw./high	1	0
						Rew./low	2	
						Startorder	4	
						Stoporder	8	
						Y1	1	0
						Y2	2	
						Y3	4	
						Sequence	8	

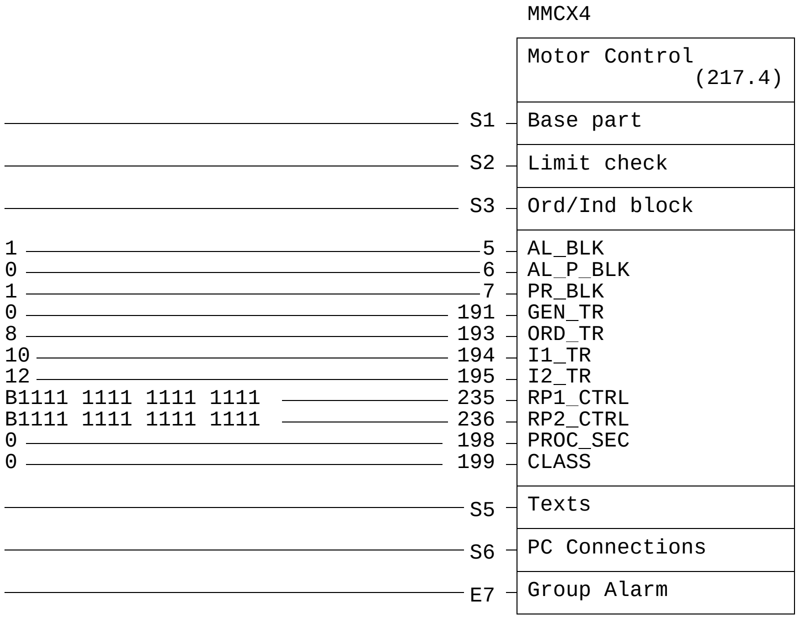
Terminal Description, Ord/Ind block (Continued)

Terminal No	Terminal Name	Value entered by	Default value	PC connection data type	Description	Remarks		
						Text	Bit value	Def. Hex. value
128	I1_EVBLK	user	H’FF80	I(r/w)	**BL**oc**K**ing of **I**ndication **EV**ents **1**. All available events are represented by a flag in I1_EVBLK. A set flag indicates a blocked event. The default value is set to block all events at indication that are not normally error indications. The I1_EVBLK table shows how to compute the I1 EVBLK value. New value can be entered as a hexadecimal string, e.g. H'F300, or as a binary string, e.g. B1111 0011 0000 0000.	Control voltage	1	0
						Bimetal relay	2	
						Local stop	4	
						Safety Monitor	8	
						Contactor	1	8
						Monitor high	2	
						Monitor low	4	
						X1 external indication/ alarm	8	
						Always 1	1	F
						Always 1	2	
						High motor current	4	
						X2 external indication/ alarm	8	
						Always 1	1	F
						Always 1	2	
						Always 1	4	
						Always 1	8	

Terminal Description, Ord/Ind block (Continued)

Termi-nal No	Terminal Name	Value entered by	Default value	PC con-nection data type	Description	Remarks		
145	I2_EVBLK	user	H'FFFF	I(r/w)	**L**oc**K**ing of **I**ndication **EV**ents **2**. All available events at indication are represented by flag in I2_EVBLK. A set flag indicates a blocked event. The default value is set to block all events. The I2_EVBLK table shows how to compute the I2 EVBLK value. New value can be entered as a hexadecimal string, e.g. H'80C1, or as a binary string, e.g. B1000 0000 1100 0001.	Text	Bit value	Def. Hex. value
						Always 1	1	F
						Local	2	
						Test	4	
						Standby	8	
						Sequence	1	F
						Auto/Manual	2	
						Always 1	4	
						Always 1	8	
						Active interlock IC1	1	F
						Active interlock IC2	2	
						Active interlock IB3	4	
						Active interlock IB4	8	
						Active interlock IB1	1	F
						Active interlock IB2	2	
						Active interlock IA	4	
						Always 1	8	
162	O_EVBLK	user	H'FF3F	–	**BL**oc**K**ing of manual **O**rders **EV**ents. All available events are represented by a flag in O_EVBLK. A set flag indicates a blocked event. The default value is set to block all events except interlock blocking. The O_EVBLK value is computed in the same way as the ORD_BLK value and uses the same table. New values can be entered as a hexadecimal string, e.g. H'0000, or as a binary string, e.g. B0000 0000 0000 0000.	The function is not implemented in Operator Station.		

Event treat



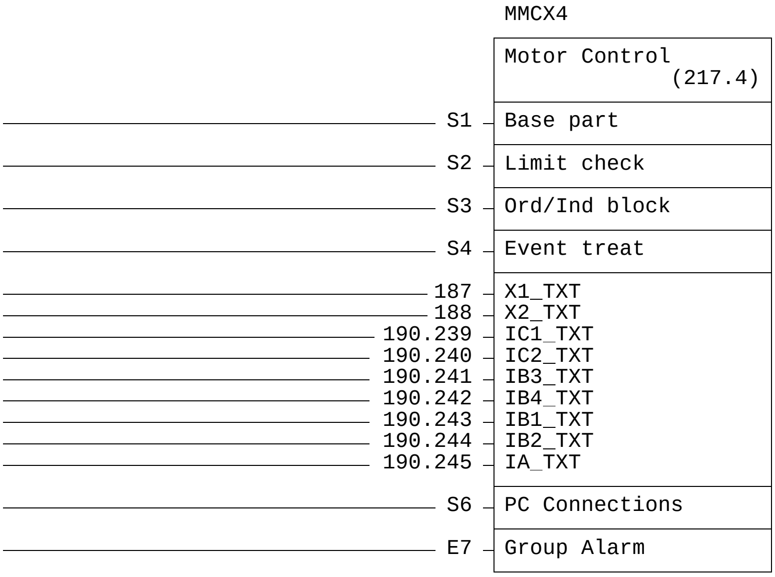
Terminal Description, Event treat

Terminal No	Terminal Name	Value entered by	Default value	PC connection data type	Description	Remarks
5	AL_BLK	dialog	1	–	Flag for **BL**oc**K**ing of **AL**arm indication and event handling in Operator Station.	–
6	AL_P_BLK	system	0	B(r/w)	**AL**arm **P**eriod **BL**oc**K** flag for temporary blocking of alarm indication and event handling in Operator Station by PC program.	–
7	PR_BLK	dialog	1	–	Flag for **BL**oc**K**ing of **PR**intout in Operator Station.	–
191	GEN_TR	user	0	–	The **GEN**eral **TR**eatment terminal assigns item numbers for event handling of ALARM BLocK orders and PRINT BLocK orders.	Function not implemented in Operator Station.
193	ORD_TR	user	8	–	The manual **ORD**er **TR**eatment terminal assigns item numbers for event handling of manual orders MORD_00..MORD_15.	Function not implemented in Operator Station.

Terminal Description, Event treat (Continued)

Terminal No	Terminal Name	Value entered by	Default value	PC connection data type	Description	Remarks
194	I1_TR	user	10	–	The **I**ndication **TR**eatment **1** terminal assigns terminal numbers for event handling of changes in IND1.	–
195	I2_TR	user	12	–	The **I**ndication **TR**eatment **2** terminal assigns terminal numbers for event handling of changes in IND2.	–
235	RP1_CTRL	user	H'FFFF	–	Every bit of the value **BL**oc**K**s **R**e**P**eat error in the corresponding bit of the IND1.	Uses the same bit-table as I1_EVBLK.
236	RP2_CTRL	user	H'FFFF	–	Every bit of the value **BL**oc**K**s **R**e**P**eat error in the corresponding bit of the IND2.	Uses the same bit-table as I2_EVBLK.
198	PROC_SEC	user	0	I(r/w)	**PROC**ess **SEC**tion is used for sectioning the alarm handling. Section numbers 1-16.	0=no sectioning. The signal may be presented in lists –1=the signal cannot be selected and cannot be presented in lists.
199	CLASS	user	0	I(r/w)	**CLASS** subdivides process section. Used by status list function in Operator Station.	–

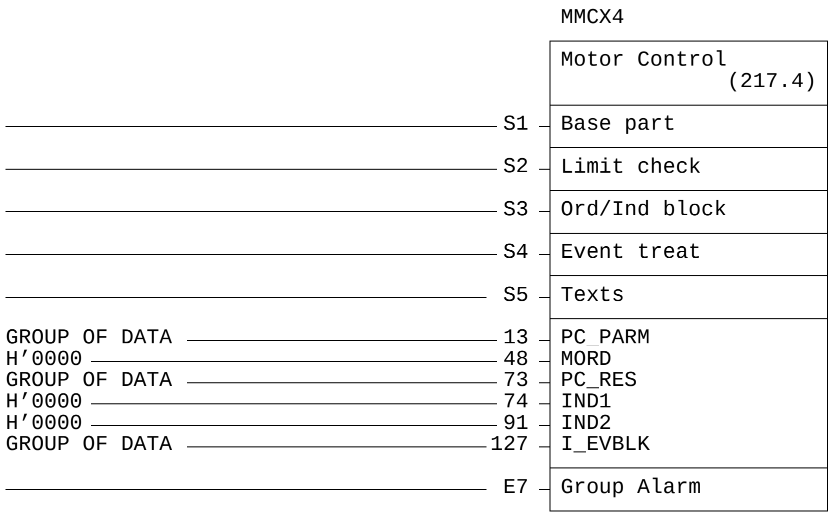
Texts



Terminal Description, Texts

Terminal No	Terminal Name	Value entered by	Default value	PC connection data type	Description	Remarks
187	X1_TXT	user	–	–	**X1 T**e**XT**. Text to be presented if the PC input X1=TRUE.	Max. 10 characters.
188	X2_TXT	user	–	–	**X2 T**e**XT**. Text to be presented if the PC input X2=TRUE.	Max. 10 characters.
190.239	IC1_TXT	user	–	–	**T**e**XT** to be presented when the **IC1** input of the PC element is FALSE.	Highest priority. Max. 17 characters.
190.240	IC2_TXT	user	–	–	**T**e**XT** to be presented when the **IC2** input of the PC element is FALSE.	Max. 17 characters.
190.241	IB3_TXT	user	–	–	**T**e**XT** to be presented when the **IB3** input of the PC element is FALSE.	Max. 17 characters.
190.242	IB4_TXT	user	–	–	**T**e**XT** to be presented when the **IB4** input of the PC element is FALSE.	Max. 17 characters.
190.243	IB1_TXT	user	–	–	**T**e**XT** to be presented when the **IB1** input of the PC element is FALSE.	Max. 17 characters.
190.244	IB2_TXT	user	–	–	**T**e**XT** to be presented when the **IB2** input of the PC element is FALSE.	Max. 17 characters.
190.245	IA_TXT	user	–	–	**T**e**XT** to be presented when the **IA** input of the PC element is FALSE.	Lowest priority. Max. 17 characters.

PC Connections



Terminal Description, PC Connections

Terminal No	Terminal Name	Value entered by	Default value	PC connection data type	Description	Remarks
13	PC_PARM	system	–	A32(r/w)	The **PC PAR**a**M**eters terminal contains group data to be connected to the PARAM terminal of the MOTCON PC element.	–
48	MORD	dialog/PC	–	I(r/w)	Group data for **M**anual **ORD**ers from the operator. Connected to the RMORD terminal of the MOTCON PC element.	–
73	PC_RES	PC	–	A12(r/w)	The **PC RES**ult terminal contains group data to be connected from the RESULT terminal of the MOTCON PC element.	–
74	IND1	PC via PC_RES	–	I(r/w)	The **IND**ication **1** terminal contains status indications received via PC_RES from PC.	–
91	IND2	PC via PC_RES	–	I(r/w)	The **IND**ication **2** terminal contains status indications received via PC_RES from PC.	–
127	I_EVBLK	PC	–	IL(r/w)	**BL**oc**K**ing of **EV**ent **I**ndication.	–

2.5 Operator Station Functions

The function is divided in principle into 3 parts:

- Presentation (Display elements, Time logged properties)
- Dialog
- Event handling

2.5.1 Presentation

Display elements which can be used for different display types are available for use in the functional unit MOTCON.

The display elements show the status and the controls of the process with different degrees of detail and is intended for the following displays:

- Object display
- Group display
- Object closeup display
- Process display

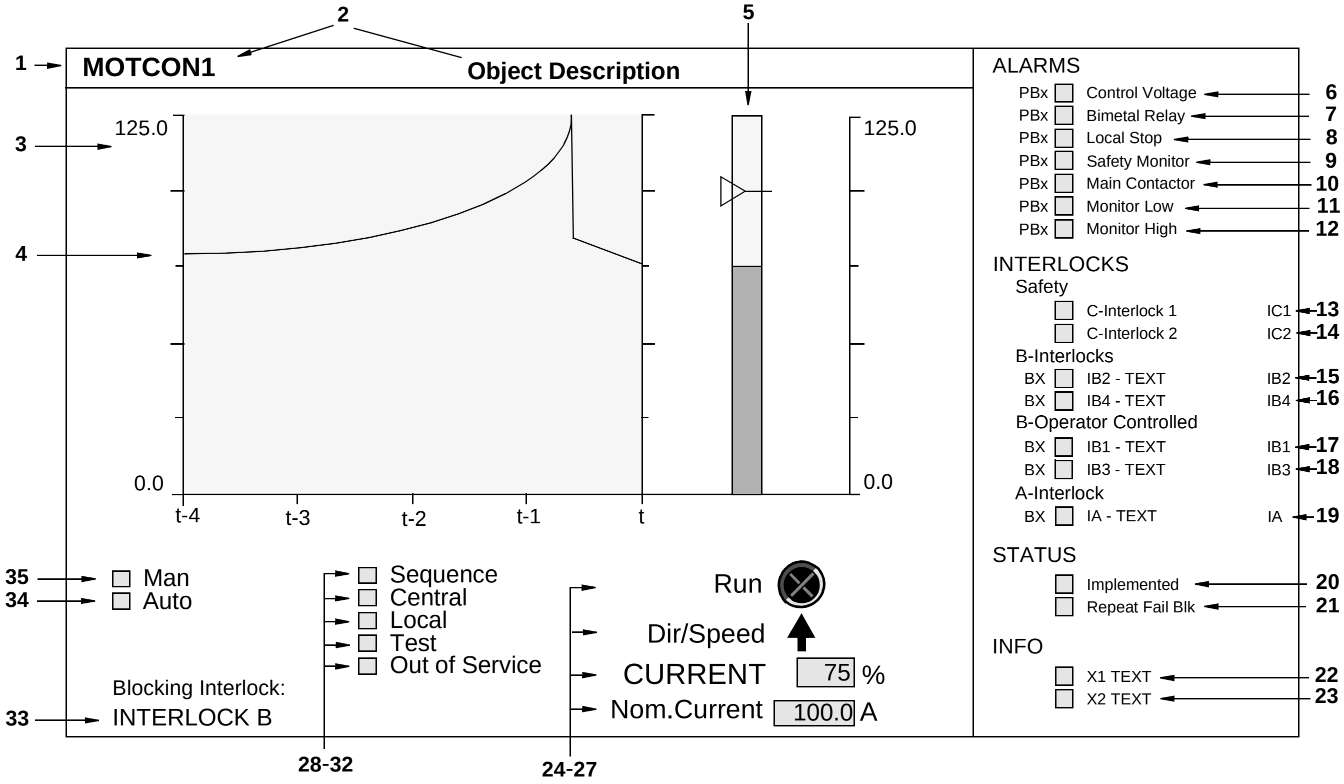
Examples of different display elements which could be used in these displays are given in the following section. A complete list of the prepared elements available is provided in the manual *AdvaCommand User Interface Reference Manual.*

Detailed information of alternative way of presentation of certain status and data within the displays such as color, flashing, blocked etc. is given in the reference manual.

Time-logged Properties

Measured values stored can be presented graphically in the form of curves on the display screen. Such a display, a **trend display**, can consist of 1-4 curves. The value for motor current can be presented in MOTCON. The logged property is designated CURR.

Object display: MOTOB01



No	Description	Remarks
1	SelectFrame	
2	Header	Object name and description
3.1	Range Max	
3.2	Range Min	
4	Trim Curve	
5.1	Bargraph	Motor current
5.2	Limit Indication	
6	ALARMS	
6.1	Printout Blocked	
6.2	Alarm Blocked	
6.3	Warning Indication	Unacknowledged alarm
6.4	Alarm 1 Text	Monitoring of Control Voltage

No	Description	Remarks
7.1	Printout Blocked	
7.2	Alarm Blocked	
7.3	Warning Indication	Unacknowledged alarm
7.4	Alarm 2 Text	Monitoring of Bimetal Relay
8.1	Printout Blocked	
8.2	Alarm Blocked	
8.3	Warning Indication	Unacknowledged alarm
8.4	Alarm 3 Text	Monitoring of Local Stop
9.1	Printout Blocked	
9.2	Alarm Blocked	
9.3	Warning Indication	Unacknowledged alarm
9.4	Alarm 4 Text	Monitoring of Safety Monitor

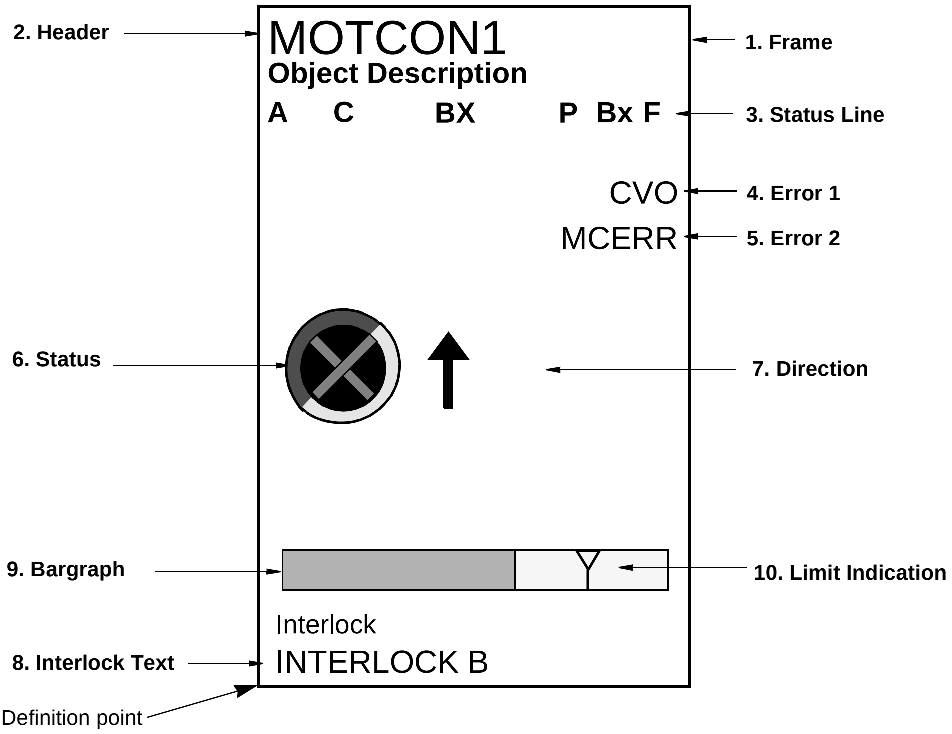
No	Description	Remarks
10.1	Printout Blocked	
10.2	Alarm Blocked	
10.3	Warning Indication	Unacknowledged alarm
10.4	Alarm 5 Text	Monitoring of Main Contactor
11.1	Printout Blocked	
11.2	Alarm Blocked	
11.3	Warning Indication	Unacknowledged alarm
11.4	Alarm Text	Monitoring of Monitor Low
12.1	Printout Blocked	
12.2	Alarm Blocked	
12.3	Warning Indication	Unacknowledged alarm
12.4	Alarm Text	Monitoring of Monitor High
13	INTERLOCKS	
13.1	IC1 Active	Safety Interlock IC1 active
13.2	IC1 Text	Safety Interlock IC1
14.1	IC2 Active	Safety Interlock IC2 active
14.2	IC2 Text	Safety Interlock IC2
15.1	IB2 Blocked	Test mode. Interlock blocked
15.2	IB2 Active	Interlock IB2 active
15.3	IB2 Text	Interlock text IB2
16.1	IB4 Block Indication	Test mode. Interlock blocked
16.2	IB4 Active	Interlock IB4 active
16.3	IB4 Text	Interlock IB4 text
17.1	IB1 Blocked	Interlock blocked
17.2	IB1 Active	Interlock IB1 active
17.3	IB1 Text	Interlock IB1 text
18.1	IB3 Blocked	Interlock blocked
18.2	IB3 Active	Interlock IB3 active
18.3	IB3 Text	Interlock IB3
19.1	IA Blocked	Test mode. Interlock blocked

No	Description	Remarks
19.2	IA Active	Interlock IA active
19.3	IA Text	Interlock IA text
20	STATUS	
20.1	Implemented Indication	
20.2	Implemented Text	
21.1	Repeat Fail Blocked Indication	The motor can be controlled
21.2	Repeat Fail Blocked Text	
22	INFO	
22.1	X1 Indication	Unack external alarm X1
22.2	X1 Text	
23.1	X2 Indication	Unack external alarm X2
23.2	X2Text	
24.1	MotorStatus Text	
24.2	MotorStatus	
25.1	Dir/Speed Text	Change of Direction in progress
25.2	Direction Indication	Direction and speed
26.1	Current Text	Current
26.2	Current Value	Motor current
26.3	Current Unit	% of norminal current
27.1	Nom. Current Text	Nominal Current of motor
27.2	Nom. Current Value	
27.3	Nom. Current Unit	Unit Ampere
28.1	Sequence Indication	Controlled from groupstart
28.2	Sequence Text	
29.1	Central Indication	Controlled from operator's place
29.2	Central Text	
30.1	Local Indication	Controlled from local panel
30.2	Local Text	
31.1	Test Indication	Jog running from motor place
31.2	Test Text	

No	Description	Remarks
32.1	Out of Service Indication	No control possible
32.2	Out of Service Text	
33.1	Blocking Interlock Text	
33.2	Actual Interlock Text	

No	Description	Remarks
34.1	Auto Indication	Auto mode. Process conditions control start/stop of motor
34.2	Auto Text	
35.1	Man Indication	Manual mode. Startorder affects the motor directly
35.2	Man Text	

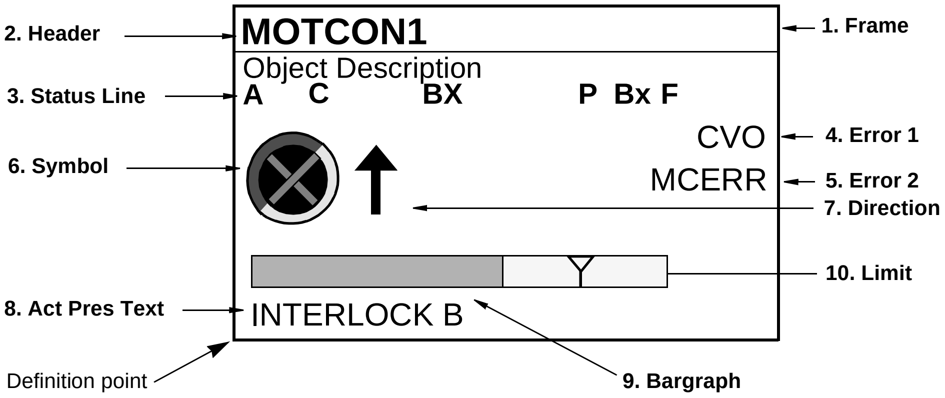
Display Element for Group display: MOTGR01



No	Description	Remarks
1	SelectFrame	
2	Header	Object name and description
3	Status Line	
3.1	Mode	
3.2	Point Of Control	
3.3	Interlock Indication	
3.4	Printout Blocked	
3.5	Alarm Blocked	
3.6	Fault Indication	

No	Description	Remarks
4	Error 1	
5	Error 2	
6	MotorStatus	
7	Direction Indication	
8.1	Interlock Text	
8.2	Act Pres Text	
9	Bargraph	
10	Limit Indication	

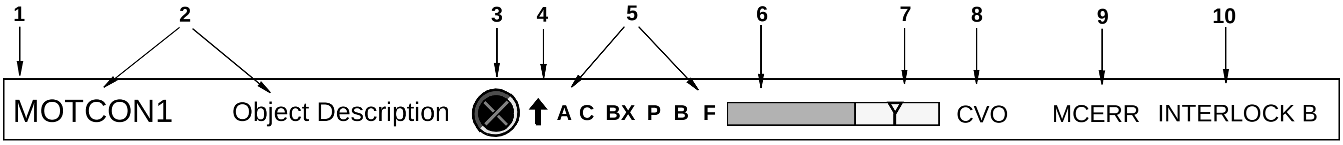
Display Element for Object closeup display: MOTWI01



No	Description	Remarks
1	SelectFrame	
2	Header	Object name and description
3	Status Line	
3.1	Mode	
3.2	Point Of Control	
3.3	Interlock Indication	
3.4	Printout Blocked	
3.5	Alarm Blocked	

No	Description	Remarks
3.6	Fault Indication	
4	Error 1	
5	Error 2	
6	MotorStatus	
7	Direction Indication	
8	Act Pres Text	
9	Bargraph	Motor Current
10	Limit Indication	

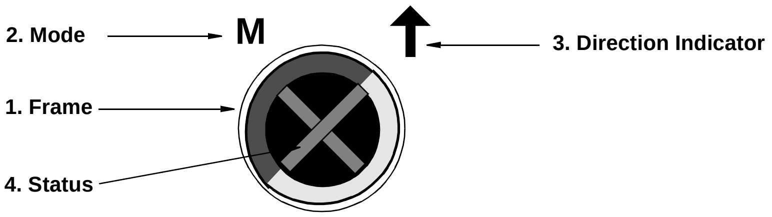
Display Element for Process display: MOTSG01



No	Description	Remarks
1	SelectFrame	
2	Header	Object name and description
3	MotorStatus	
4	Direction Indication	
5	Status Indication	
5.1	Mode	
5.2	Point Of Control	
5.3	Interlock Indication	

No	Description	Remarks
5.4	Printout Blocked	
5.5	Alarm Blocked	
5.6	Fault Indication	
6	Bargraph	Motor Current
7	Limit Indication	
8	Error 1	
9	Error 2	
10	Act Pres Text	

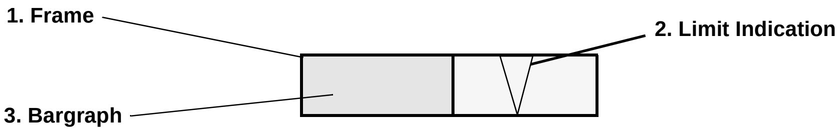
MOTPD01



No	Description	Remarks
1	SelectFrame	
2	Mode or Control point	

No	Description	Remarks
3	Direction Indication	
4	MotorStatus	

MOTPD51



No	Description	Remarks
1	SelectFrame	
2	Limit indications	

No	Description	Remarks
3	Bargraph	Motor Current

2.5.2 Dialog

The display screen is supplemented with a keyboard for operator communication with the functional unit/object.

The dialog is built up using both fixed and dynamic keys. The functions available with the dynamic keys are presented in a pattern of rectangles on the lower part of the display screen when the object is selected. The functional unit Sequence has a MIN dialog (Production level) and a MAX dialog (Maintenance level). The MIN dialog consists of an output dialog with 2 subdialogs. The MAX dialog consists of an output dialog with 3 subdialogs.

MIN dialog (No authority key)

Keyboard keys

Man	**Man**	Set to manual mode
Auto	**Auto**	Set to automatic mode
◇	**Start**	Start motor
▽	**Stop**	Stop motor
✓	**Acknowledge**	Acknowledge alarm
Object	**Object Display**	Select Object Display
📈	**Object Trend**	Select Object Trend
Dialog	**Previous Level**	Select Top Level dynamic keys
Dialog	**Next Block**	Page between the dynamic key sets (Keyboard and Order)

Dynamic keys, Top Level

D1 Sequence	D2 Central	D3 Local	D4	D5
D6 ↓ Rev/Low	D7 ↑ Forw/High	D8	D9 *Order…*	D10 *Keyboard…*

Sequence	Set control to Sequence
Central	Set control to Central
Local	Set control to Local
Rev/Low	Set direction to Reverse Low
Forw/High	Set direction to Reverse High
Order…	Select Dynamic keys: Order
Keyboard…	Select Dynamic keys: Keyboard

Dynamic keys, Order

D1 Order 1	D2 Order 2	D3 Order 3	D4	D5
D6	D7	D8	D9	D10

Order 1	Perform Order 1
Order 2	Perform Order 2
Order 3	Perform Order 3

Dynamic keys, Keyboard

D1 ■ Start	D2 Man	D3 Auto	D4	D5
D6 □ Stop	D7 Acknowledge	D8 Object Display	D9 Object Trend	D10

Start	Start motor
Man	Set to manual mode
Auto	Set to automatic mode
Stop	Stop motor
Acknowledge	Acknowledge alarm
Object Display	Select Object Display
Object Trend	Select Object Trend

MAX dialog (Authority key)

Keyboard keys

Man	**Man**	Set to manual mode
Auto	**Auto**	Set to automatic mode
◇	**Start**	Start motor
▽	**Stop**	Stop motor
✓	**Acknowledge**	Acknowledge alarm
Object	**Object Display**	Select Object Display
	Object Trend	Select Object Trend
Dialog	**Previous Level**	Select Top Level dynamic keys
Dialog	**Next Block**	Page between the dynamic key sets (Keyboard, Block and Order)

Dynamic keys, Top Level

D1 Sequence	D2 Central	D3 Local	D4 Test	D5 Our of Service
D6 ↓ Rev/Low	D7 ↑ Forw/High	D8 *Block…*	D9 *Order…*	D10 *Keyboard…*

Sequence	Set control to Sequence
Central	Set control to Central
Local	Set control to Local
Test	Set control to Test
Out of Service	Set control to Out of Service
Rev/Low	Set direction to Reverse Low
Forw/High	Set direction to Forward High
Block…	Select Dynamic keys: Block
Order…	Select Dynamic keys: Order
Keyboard…	Select Dynamic keys: Keyboard

Dynamic keys, Keyboard…

D1 ■ Start	D2 Man	D3 Auto	D4	D5
D6 □ Stop	D7 Acknowledge	D8 Object Display	D9 Object Trend	D10

Start	Start motor
Man	Set to manual mode
Auto	Set to automatic mode
Stop	Stop motor
Acknowledge	Acknowledge alarm
Object Display	Select Object Display
Object Trend	Select Object Trend

Dynamic keys, Order

D1 Order 1	D2 Order 2	D3 Order 3	D4	D5
D6	D7	D8	D9	D10

Order 1	Perform Order 1
Order 2	Perform Order 2
Order 3	Perform Order 3

Dynamic keys, Block…

D1	D2 Block Alarm	D3 Block Printout	D4	D5 Override Interlock
D6	D7 Deblock Alarm	D8 Deblock Printout	D9	D10 Normal Interlock

Block Alarm	Block alarm indication
Block Printout	Block event printout
Override Interlock	Override interlocking
Deblock Alarm	Deblock alarm indication
Deblock Printout	Deblock event printout
Normal Interlock	Interlocking

2.5.3 Event Handling

General

This section contains a description of all alarms and events in the functional unit MOTCON. The event texts are also given in the manual *AdvaCommand Basic Functions User's Guide*.

When a motor has been stopped no alarm is given at the connections M1, M2, M3, M4, V1 and V2 or at contactor fault. Figure 2-4 shows diagrammatically the relation between indications and the parameters which can be used to block event handling for certain indications and points out a required handling in the operator's station.

The possibilities of the operator to block event printouts and alarms are shown under the heading 'Event and alarm blocking' below.

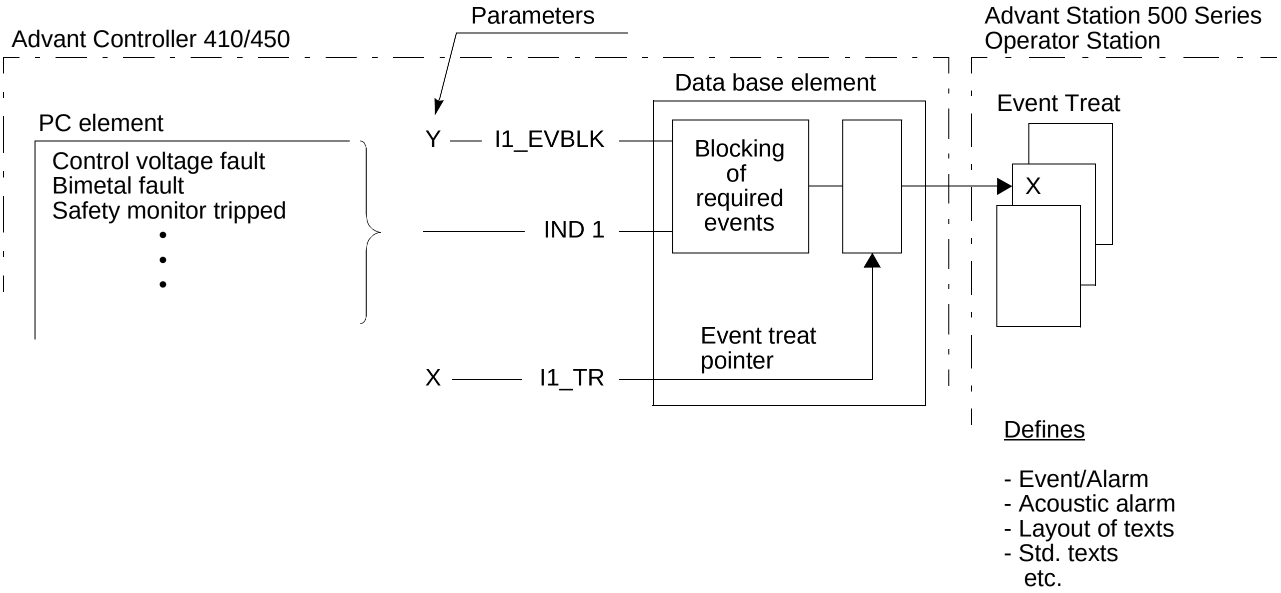


Figure 2-4. Examples of event handling of indications is controlled by parameters

The events are divided into groups. One pointer is allocated to each group which means that the individual events of the group are, in several respects, handled in the same way in Advant Station 500 Series Operator Station. For each group different handling can be selected for status changes 0-->1 and 1-->0 respectively. The texts which are written out in different lists are individual for each event. The group division - which events are associated with the pointer - is given in 'Event description with standard texts' below. This also specifies which event handling is obtained as default and which alternative standard functions are available.

Table 2-5. Event Texts for MOTCON

Signal[(1)]	**Events**	**Event Treat pointer**	**Property text**		**Event text**	
			Standard text	**Line No in Event Treat**	**Standard text**	**Line No in Event Treat**
IND1_00	Control voltage absent	I1_TR	ControlV	1	Alarm	1
IND1_00	Control voltage restored	I1_TR	ControlV	1	Normal	2
IND1_01	Bimetal relay has tripped	I1_TR	BimetalR	2	Alarm	1
IND1_01	Bimetal relay triggered	I1_TR	BimetalR	2	Normal	2
IND1_02	Local Stop	I1_TR	LStop	3	Alarm	1
IND1_02	Local Stop ended	I1_TR	LStop	3	Normal	2
IND1_03	Safety Monitor tripped	I1_TR	SafeMon	4	Alarm	1
IND1_03	Safety Monitor triggered	I1_TR	SafeMon	4	Normal	2
IND1_04	Main contactor Error	I1_TR	MainCErr	5	Alarm	1
IND1_04	Main contactor Error acknowledged	I1_TR	MainCErr	5	Normal	2
IND1_05	Monitor Low tripped	I1_TR	MonLow	6	Alarm	1
IND1_05	Monitor Low restored	I1_TR	MonLow	6	Normal	2
IND1_06	Monitor High tripped	I1_TR	MonHigh	7	Alarm	1
IND1_06	Monitor High restored	I1_TR	MonHigh	7	Normal	2
IND1_07	Position A reached	I1_TR	Pos A	8	Alarm	1
IND1_07	Position A left	I1_TR	Pos A	8	Normal	2
IND1_10	Current limit 100 % exceeded	I1_TR	HighCurr	11	Alarm	1
IND1_10	Current limit 100 % re-entered	I1_TR	HighCurr	11	Normal	2
IND1_11	Position B reached	I1_TR	Pos B	12	Alarm	1
IND1_11	Position B left	I1_TR	Pos B	12	Normal	2
IND2_01	Control mode Local On	I2_TR	Local	2	On	1
IND2_01	Control mode Local Off	I2_TR	Local	2	Off	2
IND2_02	Control mode Test On	I2_TR	Test	3	On	1

Table 2-5. Event Texts for MOTCON (Continued)

Signal[1]	Events	Event Treat pointer	Property text		Event text	
			Standard text	Line No in Event Treat	Standard text	Line No in Event Treat
IND2_02	Control mode Test Off	I2_TR	Test	3	Off	2
IND2_03	Control mode Standby On	I2_TR	Standby	4	On	1
IND2_03	Control mode Standby Off	I2_TR	Standby	4	Off	2
IND2_04	Control mode Sequence On	I2_TR	Sequence	5	On	1
IND2_04	Control mode Sequence Off	I2_TR	Sequence	5	Off	2
IND2_05	Op. mode Auto On	I2_TR	Auto	6	On	1
IND2_05	Op. mode Auto Off	I2_TR	Auto	6	Off	2
IND2_08	Interlock IC1 On	I2_TR	CInterl1	9	On	1
IND2_08	Interlock IC1 Off	I2_TR	CInterl1	9	Off	2
IND2_09	Interlock IC2 On	I2_TR	CInterl2	10	On	1
IND2_09	Interlock IC2 Off	I2_TR	CInterl2	10	Off	2
IND2_12	Interlock IB1 On	I2_TR	BInterl1	13	On	1
IND2_12	Interlock IB1 Off	I2_TR	BInterl1	13	Off	2
IND2_13	Interlock IB2 On	I2_TR	BInterl2	14	On	1
IND2_13	Interlock IB2 Off	I2_TR	BInterl2	14	Off	2
IND2_10	Interlock IB3 On	I2_TR	BInterl3	11	On	1
IND2_10	Interlock IB3 Off	I2_TR	BInterl3	11	Off	2
IND2_11	Interlock IB4 On	I2_TR	BInterl4	12	On	1
IND2_11	Interlock IB4 Off	I2_TR	BInterl4	12	Off	2
IND2_14	Interlock IA On	I2_TR	AInterl	15	Off	1
IND2_14	Interlock IA Off	I2_TR	AInterl	15	Off	2

(1) This column is unique for this manual. It is not included in the manual “AdvaCommand Basic Functions User’s Guide”.

Event and alarm blocking

In addition to the configurable blocking facilities described under the heading 'General', the operator at Advant Station 500 Series Operator Station can block the listed event and alarm handling. Special commands are available.

Table 2-6. Special blocking commands

Dialog Key	Event- and Alarm handling blocked for signals	Remark
BLK ALARM (Block alarm)	All signals IND1_XX and IND2_XX	–
BLK PRINT (Block print)	All signals IND1_XX and IND2_XX	Blocks printout on printer only

2.5.4 Text Handling

Each interlocking can be associated to a descriptive text of maximum 17 characters. These texts are implemented with the data base element and they are presented on various displays in Operator Station. For A and B interlockings the texts are always presented on the right hand part of the object display. If one or several of the interlockings are active the text valid for the interlocking with highest priority is copied to the property ACT_PRES_TEXT in the data base. This property is presented on the object display, the motor group display and the window display used in the process displays.

The text is presented in yellow colour if the object in question is ready for start else in red color. The priority is in order IC1, IC2, IB1, IB2, IB3, IB4, IA from higher to lower priority. When no interlocking is valid the text is cleared out.

2.6 Application Examples

2.6.1 Example 1

Description

Motor start in one direction. The solution is completely based on the MOTCON element basic function with the addition of C2.

Comments to the overview diagram

Interlockings

If there are no interlockings, the interlocking inputs on the PC element are set to 1.

External stop. Group start

The start and stop inputs are reset to 0 and set to 1 respectively. BLK RFS and ACK1 can be used if the motor is included in a group start.

Time settings

Show suitable values at T1, T2 and T3.

PC-logic

NOINT is connected to TSTF. TRIP, SACK and RUN can be used in another PC-logic.

I/O Connections

DI CVO is connected to the fusing of the control voltage in the switch gear for presentation and activation of alarms at incorrect control voltage.

DI BIM is connected to the thermal relay F14 for presentation and activation of alarm.

DI LSTOP is connected to the auxiliary contact in the safety switch SB, connected in series with a stop button on the motor, for presentation and activation of alarm by STOP AT MOTOR.

The stop button, with the connections shown, can have an emergency stop status. The stop button is also intended for use during test running without activating alarms.

DO MC controls main contactor K11.

DI MCA monitors the position of main contactor K11 for, for example, presentation of motor in operation, self-holding function and alarm activation with faulty main contactor.

AI CURR is connected to a transmitter for motor current. The signal is used for presentation.

DI TM is connected to a start button located at the motor. The start button activates the system during test running.

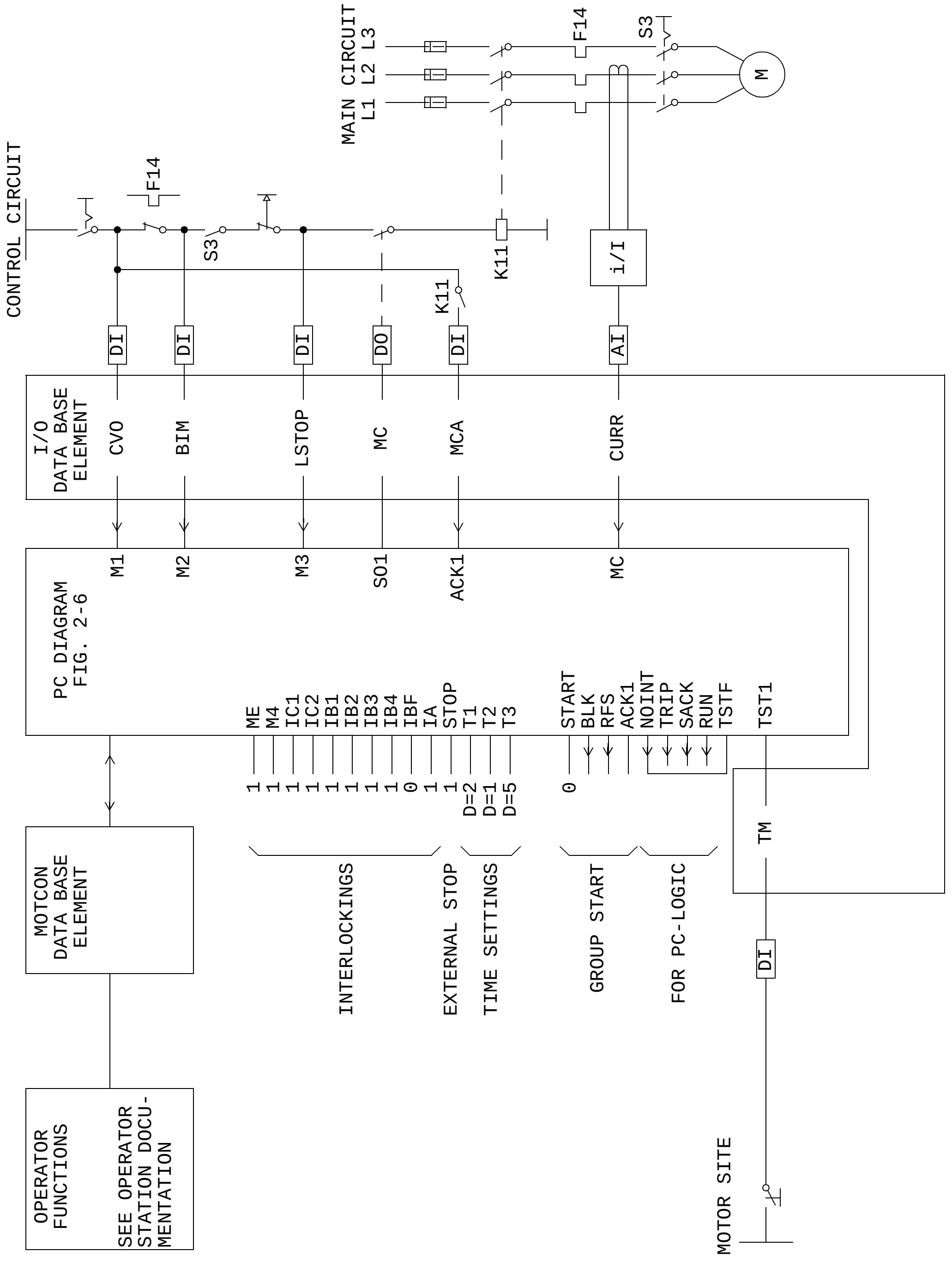


Figure 2-5. Overview diagram, Example 1

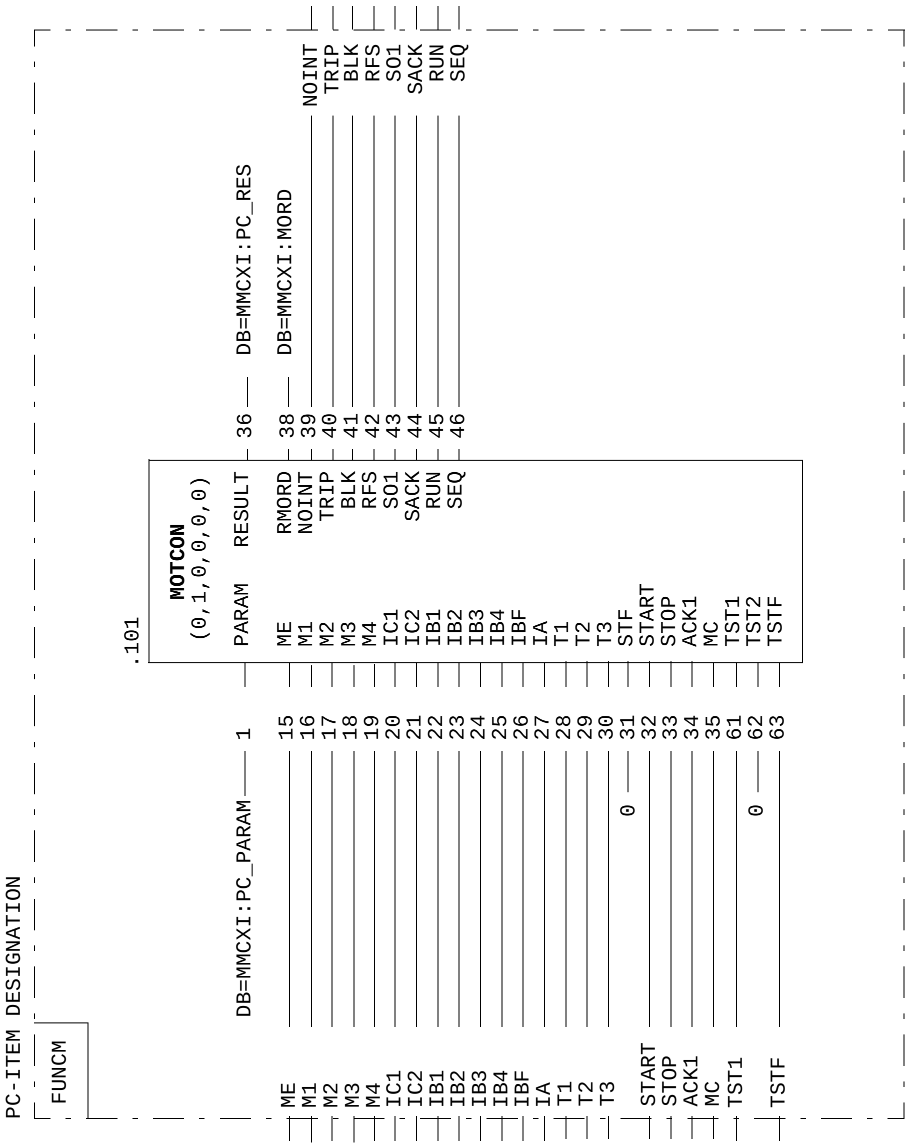

PC-ITEM DESIGNATION
FUNCM
.101
MOTCON
(0,1,0,0,0,0)
PARAM
RESULT
DB=MMCXI:PC_PARAM
1
DB=MMCXI:PC_RES
36
DB=MMCXI:MORD
38
ME M1 M2 M3 M4 IC1 IC2 IB1 IB2 IB3 IB4 IBF IA T1 T2 T3 STF START STOP ACK1 MC TST1 TST2 TSTF
15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 61 62 63
0
0
RMORD NOINT TRIP BLK RFS SO1 SACK RUN SEQ
38 39 40 41 42 43 44 45 46
NOINT TRIP BLK RFS SO1 SACK RUN SEQ
ME M1 M2 M3 M4 IC1 IC2 IB1 IB2 IB3 IB4 IBF IA T1 T2 T3 START STOP ACK1 MC TST1 TSTF

Figure 2-6. PC diagram, Example 1

2.6.2 Example 2

Description

Motor start Forward/Reverse with variant for rotation monitor. The solution is completely based on the basic function of the MOTCON element with additions C1, C2, and C5.

Comments to the overview diagram

Interlockings

If there are no interlockings, the interlocking inputs on the PC element are set to 1.

External stop/selection. Group start

The start and stop inputs are reset to zero and set to 1 respectively SEL1, SEL2 and STF are reset. BLK RFS ACK1 and ACK2 can be used if the motor is included in a group start.

Time settings

NOINT is connected to TSTF. TRIP, SACK, RUN and DCH can be used in another PC-logic.

PC-logic

NOINT is connected to TSTF. TRIP, SACK, RUN and DCH can be used in another PC-logic.

I/O Connections

DI CVO is connected to the fusing of control voltage in the switch gear for presentation and activation of alarm at incorrect control voltage.

DI BIM is connected to the thermal relay F14 for presentation and activation of alarm.

DI LSTOP is connected to an auxiliary contact in the safety switch SB, connected in series with a stop button at the motor for presentation and activation of the alarm designated STOP AT MOTOR.

With the connections shown, the stop button can have the status of an emergency stop. The stop button is also intended to be used during test running without activating alarms.

DO MCF controls main contactor K11 in the forward direction.

DO MCR controls the main contactor K21 in the reverse direction.

DI MCAF monitors the position of the main contactor K11 for, for examples, presentation of motor in operation, self holding function and activation of alarm with fault of MAIN CONTACTOR type.

DO MCAR monitors the position of the main contactor K21 for, for examples, presentation of motor in operation, self holding function and activation of alarm with MAIN CONTACTOR fault.

AI CURR is connected to a transmitter for motor current. The signal is used for presentation.

DI TMF is connected to the start button for forward running of the motor. The start button activates the system with test running.

DI TMR is connected to the start button for reversed running of the motor. The start button activates the system with test running.

I/O connection for variant with monitor

DI MONL is connected to the low alarm output of the monitor.

DI MONH is connected to the high alarm output of the monitor.

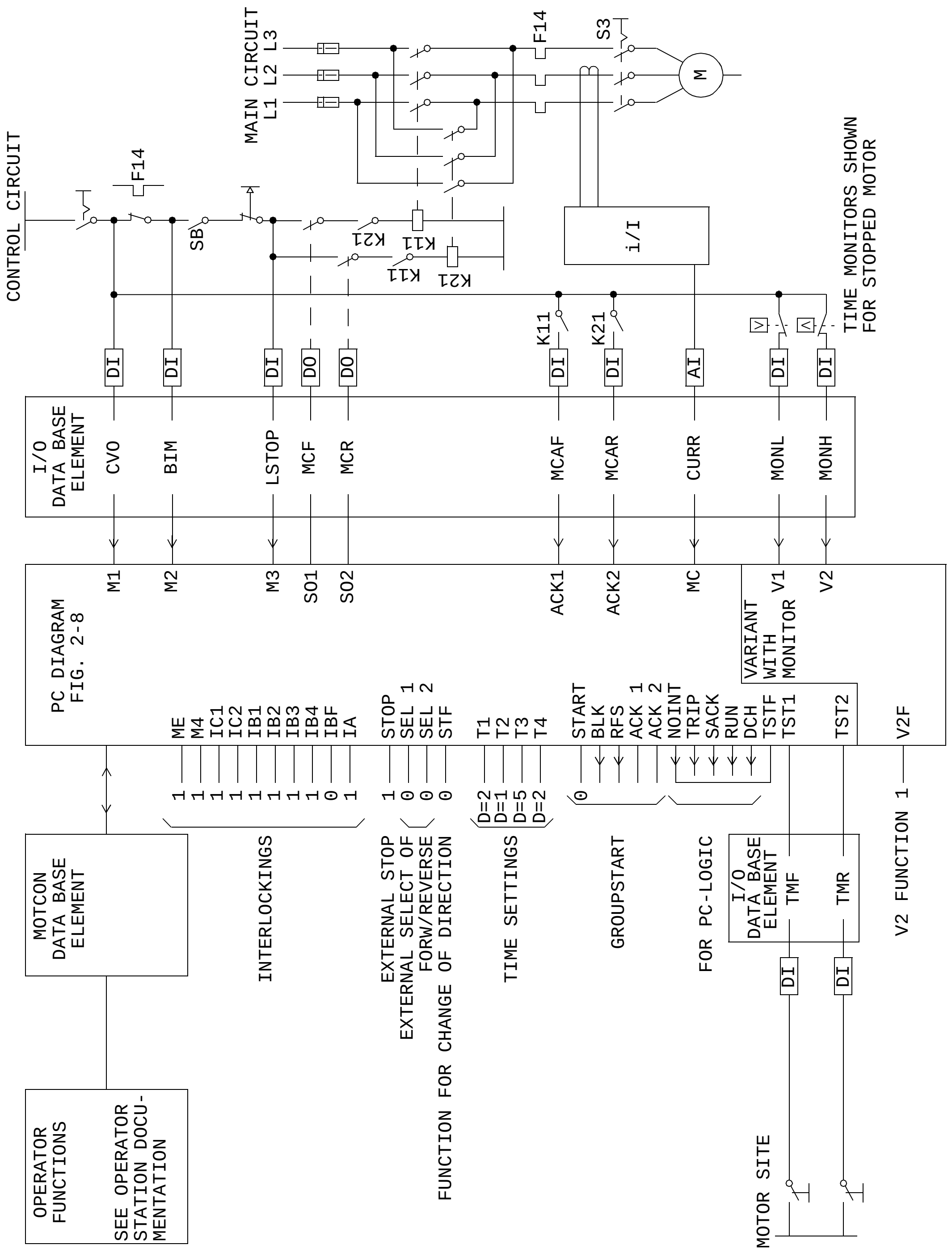


Figure 2-7. Overview diagram, Example 2

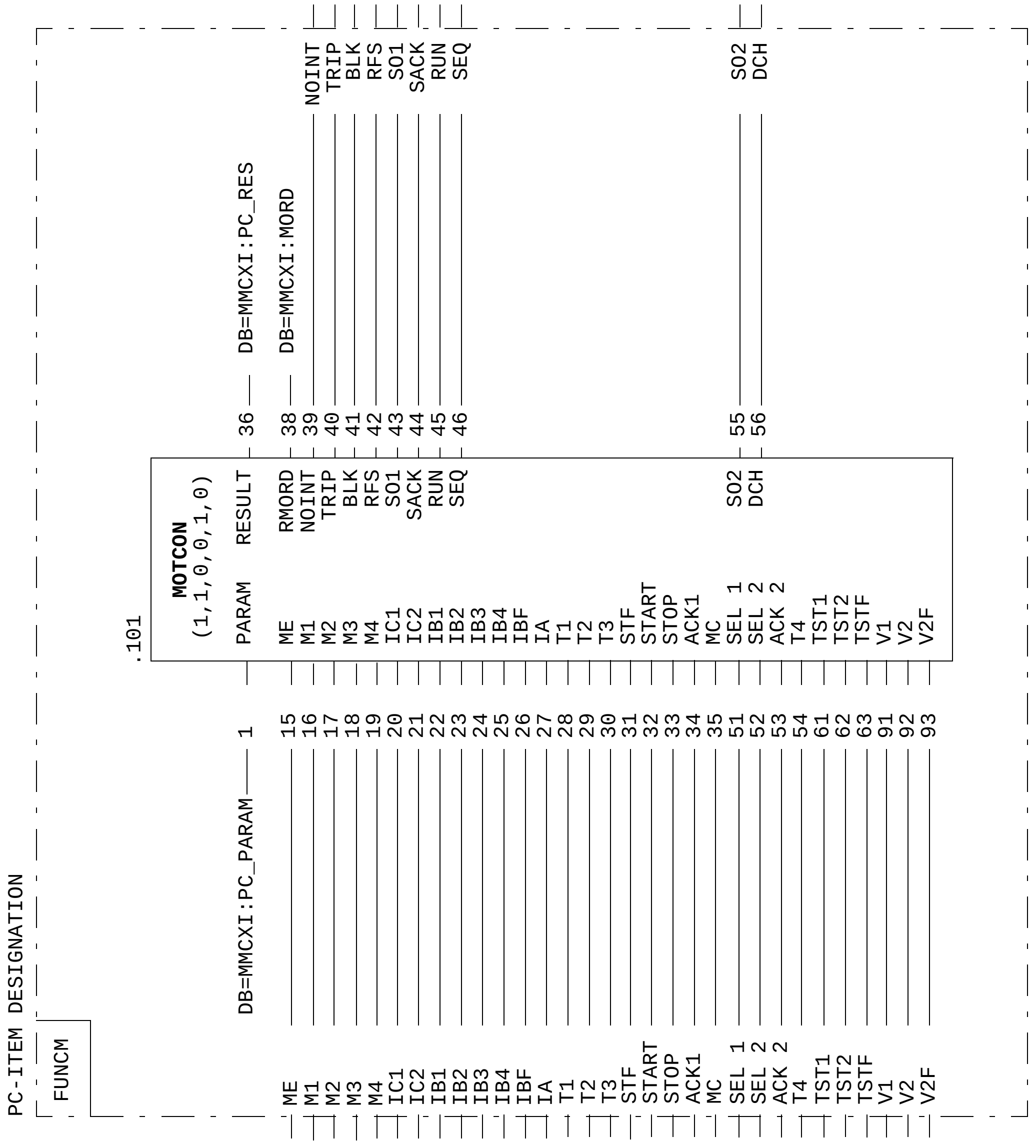


Figure 2-8. PC diagram, Example 2

2.6.3 Example 3

Description

Start/stop of high voltage motor with a limited number of starts.

The function is based on the basic MOTCON element function with the addition of C2. In addition to the MOTCON functions, there is PC-logic for limitation of the start intensity and a monostable for start pulses.

Comments to the overview diagram

Interlockings

If there are no interlockings, the interlocking inputs on the PC element are set to 1.

External stop. Group start

The start and stop inputs are reset (to 0) and set (to 1) respectively. BLK RFS and ACK1 can be used if the motor is included in a group start.

Time settings

Show suitable values of T1, T2, T3, STIME and WTIME.

PC-logic

NOINT is linked to TSTF. TRIP, SACK and RUN can be used in other PC-logic.

I/O Connections

DI CVO is connected to the fusing of the control voltage in the switch gear for presentation and alarm generation at incorrect control voltage.

DI BIM is connected to the thermal relay F14 for presen-tation and alarm generation with fault BIMETAL RELAY.

DI LSTOP is connected to an auxiliary contact in the safety switch SB, connected in series with a stop button at the motor for presentation and generation of the STOP AT MOTOR alarm.

The stop button can function as an emergency stop button in this application. The stop button is also intended for use during test running and the alarm function is then disconnected.

DO MC operates the main contactor K11.

DI MCA monitors the position of the main contactor K11 to permit presentation of motor in OPERATION, self-holding function and alarm generation with MAIN CONTACTOR.

AI CURR is connected to the transmitter for motor current.The signal is used for presentation.

DI TM is connected to a start button placed at the motor. The start button activates the system when test running.

Comments to the PC-diagram

The start-intensity supervision functions in accordance with the following:

- The number of switch-offs at the motor switch is monitored via the input ACK1 and is counted at pos. 103.
- When the number of switch-offs of the motor switch has exceeded the number specified at NOS, within the time specified at STIME, the output 13 at pos. 103 is set to 1. The monostable 104 goes to 1 and blocks the motor via the interlocking input IC1 during the time WTIME. The text in the object display during the blocking interlocking is MANY STARTS.
- The counter, pos. 103 is reset when the monostable 102 goes to zero.
- The time WTIME is to be > STIME!

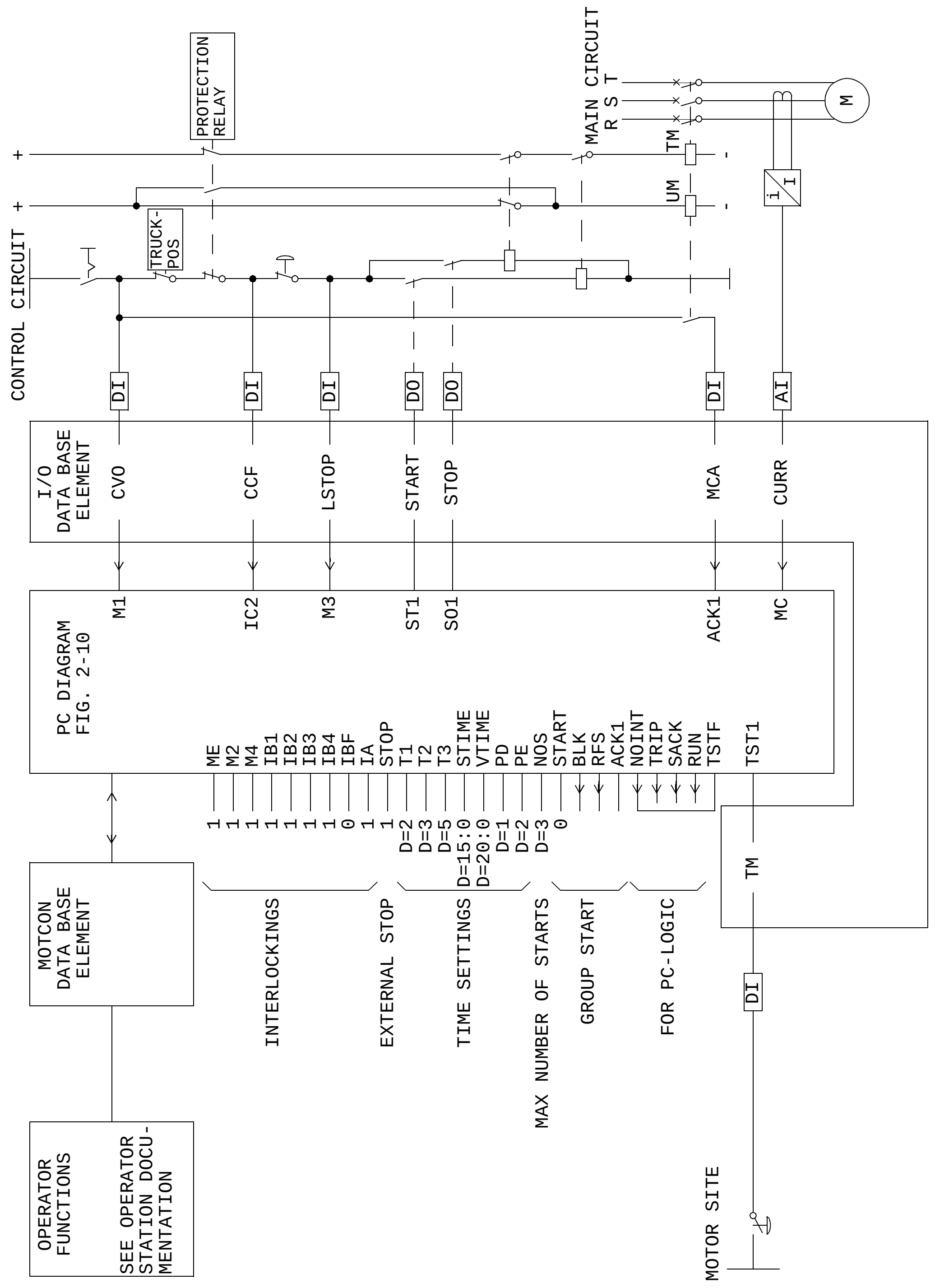


Figure 2-9. Overview diagram, Example 3

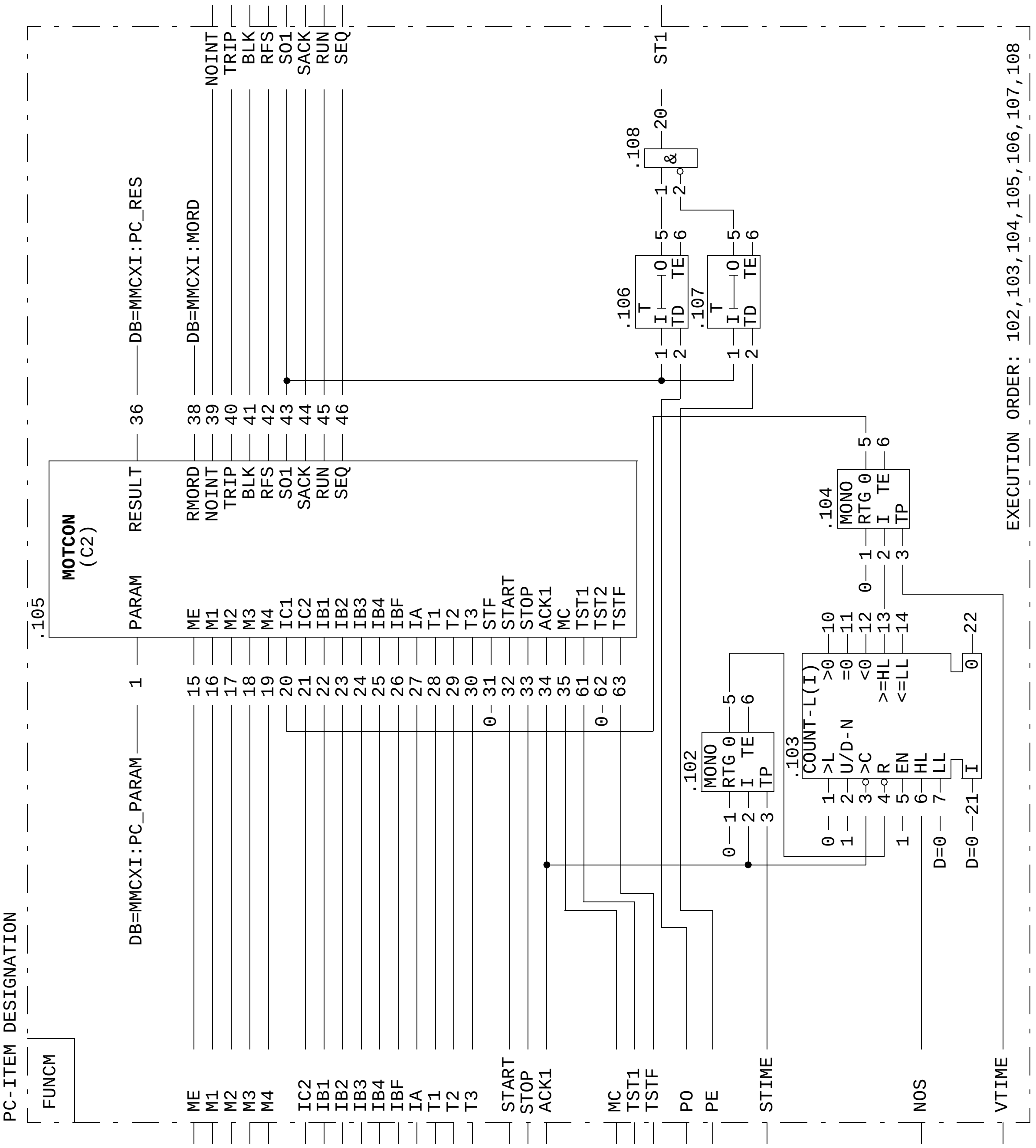


Figure 2-10. PC diagram, Example 3

2.6.4 Example 4

Description

SEQ is the default point of control at system initialization. In some application this is not preferable. With an additional circuit showed in PC-diagram, Figure 2-11, it is possible to force the MOTCON into the point of control CENTRAL at system initialization. This start up function, of course, can be combined with any other relevant application function.

The same principle as described here can be used for the functional unit VALVECON.

Comments to the PC-diagram

- Please note the execution order. The single executed CONTRM including the “forcing to CENTRAL” must be inserted after the CONTRM including MOTCON.
- The MOTCON data base property used in the start up function is not exposed in the data base element. It is referred by =MMC_X.TAG:52. The TAG used in the example is MMCX3.

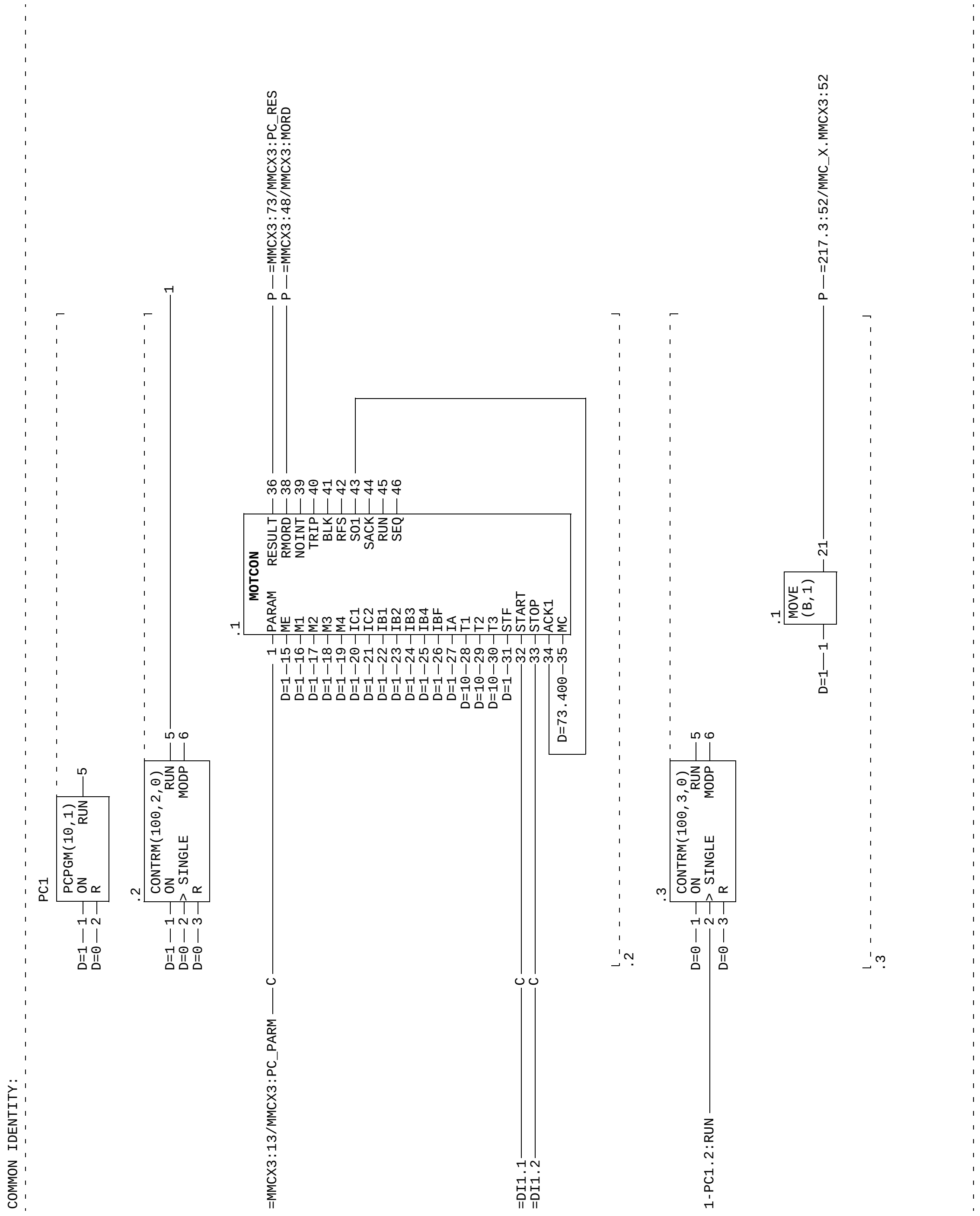


Figure 2-11. PC diagram, Example 4

2.7 Function diagram

The function diagram in section A.2 in appendix A describes in detail the logical relation between all input and output signals in the functional unit.

Chapter 3 VALVECON

VALVECON is a functional unit designed for the control of 2-position valves in different processes.

The functional unit is standardized to a high degree to simplify the work of designing presentation, dialog and control logic. The unit has many optional capabilities which increase its operational flexibility. VALVECON normally performs its control function without help from other elements.

VALVECON is used in the control of 2-position valves from Advant Station 500 Series Operator Station, control desks or control organs at the valve itself. The valve can be controlled from a master control function (e.g. group start, level regulation from level gauges etc.).

3.1 Configuration

VALVECON like other functional units is built up of three parts:

- A PC element which is handled in the same way as other PC elements in the ABB Advant Controller 410/450 range of products.
- A section for operator functions which consists of presentation and order functions. Data and parameters from the process are presented on a Advant Station 500 Series Operator Station. A keyboard of the Advant Station 500 Series Operator Station is used by the operator to enter commands which control the operation of the functional unit. The response to the operator’s intervention is shown on the display screen of the Advant Station 500 Series Operator Station. The application work for this part is normally limited to the arrangement of the display.
- A data base element with configuration constants and dynamic data used by both operator station and PC parts.

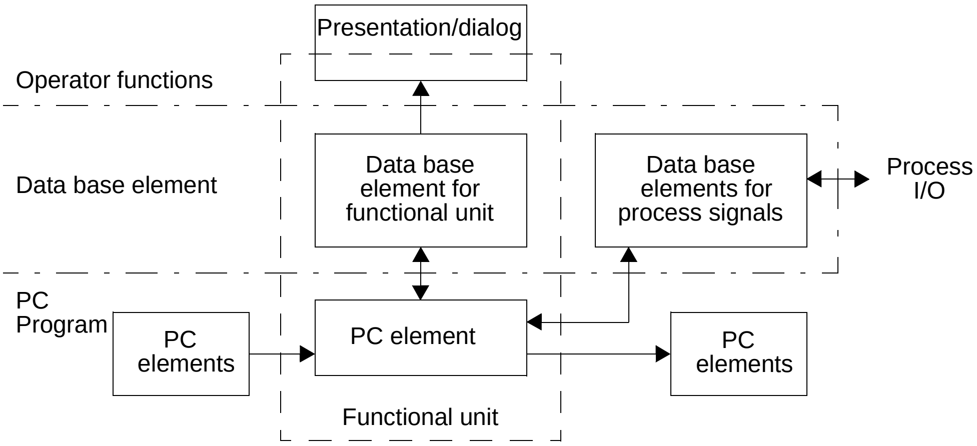


Figure 3-1. The structure of the functional unit

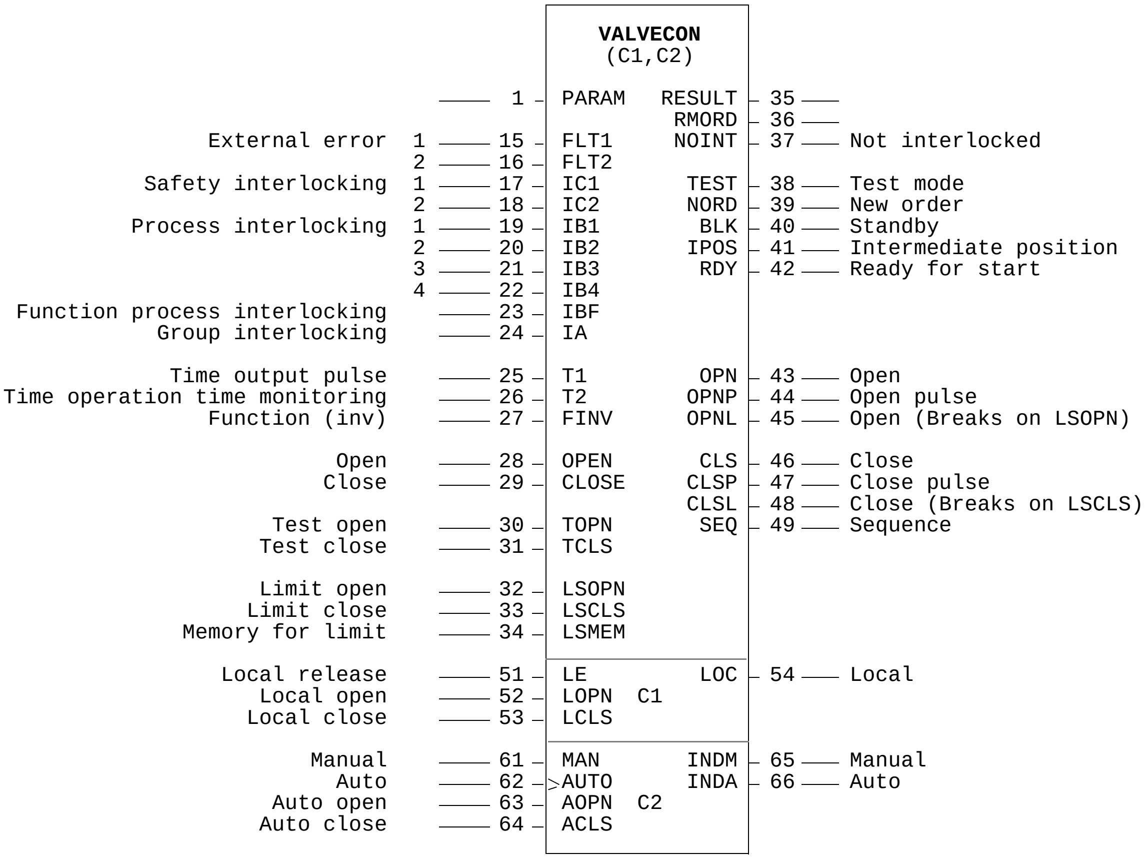


Figure 3-2. PC element, Complete symbol

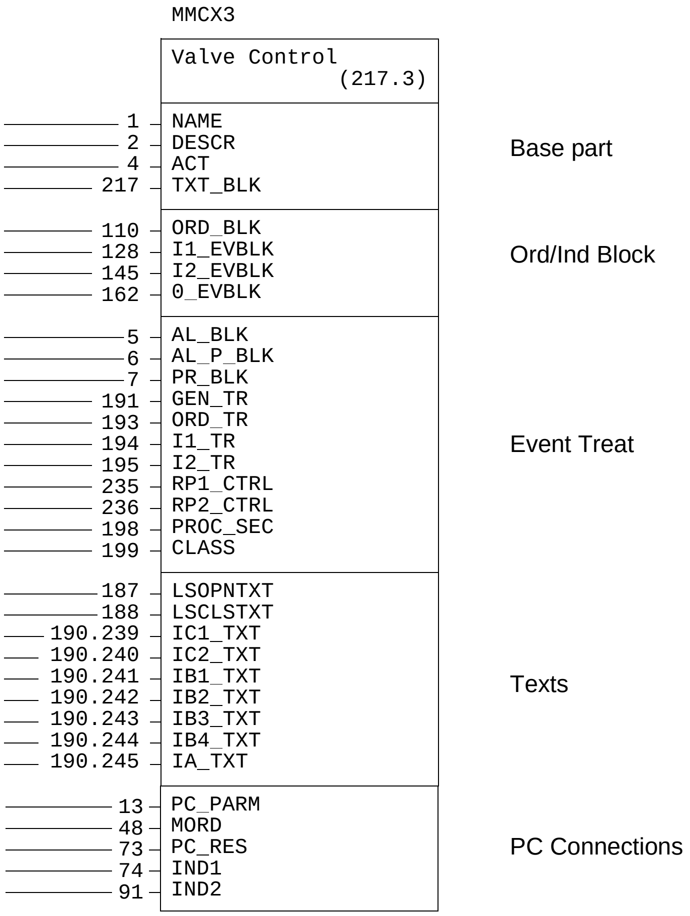


Figure 3-3. Data base element, Complete symbol

3.2 Function

3.2.1 Basic Properties

The functional unit VALVECON is designed for control of 2-position valves.

VALVECON consists of a basic section and two optional additional functions. The basic section includes

- Evaluation of interlockings
- Open/close control
- Operation time supervision

The following functions can be selected:

- Control from a local operator’s console
- Man/Auto operation

Points of control

VALVECON may be controlled from different locations. The operator is able to select point of control from the alternatives offered by VALVECON. All these choices may be made from the CENTRAL operator station. In addition, the LOCAL point of control may also be selected from the local control station.

The different points of control are as follows:

CENTRAL	The valve is controlled from Advant Station 500 Series Operator Station. Control from other locations is blocked.
SEQUENCE	The valve is controlled from a superior PC program, e.g. for group start or level control. SEQUENCE is the default point of control. Control from other locations is blocked.
LOCAL	The valve is controlled from a local desk or panel. Control from other locations is blocked. The choice of local control is enabled by setting the call parameter C1 of the PC element to ‘1’.
TEST	The point of control TEST is suitable for testing the valve in the field. The valve is supposed to be controlled from an operating station adjacent to the valve. Control from other locations is blocked.
STANDBY	The valve is brought to its home position and all orders to it are then blocked.

Control modes

VALVECON supports the control modes MAN and AUTO.

MAN	In the MANual control mode, the valve may be controlled directly from the selected point of control (provided that point of control is not STANDBY).
AUTO	In the AUTOmatic control mode, the process controls the valve by way of a PC program. AUTO is used e.g. for level control, using level transmitters. The part for AUTO is included by setting the call parameter C2 of the PC element to ‘1’.

Home position

The home position of the valve is defined by the terminals :FINV as follows:

:FINV=0	‘Closed’ is the home position
:FINV=1	‘Open’ is the home position

When an interlock is active, or when there is an external fault (as evidenced by the terminals :FLT1 = 0 or :FLT2 = 0),VALVECON orders the valve to its home position.

Ready for operation

Ready for operation means that all the interlocks for operation are satisfied and that the point of control is neither TEST, nor STANDBY.

Ready for operation is indicated by the VALVECON displays in Advant Station 500 Series Operator Station and by the PC output terminal :RDY (Ready).

Start-up

An initialization phase begins at start of the system. The result of this becomes

- The outputs are reset (to zero) except for the SEQ output which is set (to 1). This is also performed when the PC program is deblocked.
- SEQ is the default point of control at system initialization. With an additional circuit it is possible to force the point of control to CENTRAL at system initialization. Please refer to the principles given in the application example for MOTCON, Section 2.6.4 Example 4.
- Elements in the data base connected from PC elements are reset. Status indications for fault status and repeated fault are removed.

3.2.2 Interlockings

The valve control can be interlocked by signals from the process and also by signals from the PC logic. An active interlocking orders the valve to its home position. The interlockings are divided into three groups with the following designations and functions:

- C-interlockings which interlock the object for safety purposes. The two safety interlockings, IC1 and IC2, cannot be blocked.
- B-interlockings. There can be 4 normal process interlockings, IB1- IB4. The interlockings IB1 and IB3 can be blocked by the operator. If the parameter IBF is set to 1 (TRUE), IB3 and IB4 function as start interlockings. A start inter-locking prevents the valve from leaving its home position. A start interlocking cannot, however get the valve back into home position if the valve has already left its home position.
- A-interlocking. This interlocking is used if the object is to be interlocked against other objects such as a pump motor or a group start or other conditions in an automatic sequence. The interlocking cannot be blocked.

An interlocking is active when the PC-input is 0 (FALSE). All A and B interlockings are blocked when the TEST point of control is selected.

3.2.3 Points of Control

By selecting point of control, the operator decides from which location the valve is to be controlled. All points of control may be selected through dialog in Advant Station 500 Series Operator Station. However, the LOCAL point of control may also be selected from the local control station through the PC element input :LE, provided that the current point of control is neither TEST nor STANDBY.

From the different points of control, VALVECON is controlled as follows. For a summary of the points of control, see Table 3-1.

CENTRAL

The valve is controlled from Advant Station 500 Series Operator Station dialog. Control from other locations is blocked.

Control mode MAN

The operator controls the valve from Advant Station 500 Series Operator Station. The operator at the LOCAL location is however able to bring the valve to its home position through the PC inputs :LOPN/ :LCLS.

Control mode AUTO

The process controls the valve through the PC inputs :AOPN/ :ACLS. The operator is able to bring the valve to its home position from Advant Station 500 Series Operator Station or from the local control station, in the latter case by means of the PC inputs :LOPN/ :LCLS.

SEQUENCE

The valve is controlled from a superior PC program, e.g. for group control. SEQUENCE is the default point of control. Control from other locations is blocked.

Control mode MAN

A superior PC program controls the valve through the PC inputs :OPEN and :CLOSE. The operator is able to bring the valve to its home position from Advant Station 500 Series Operator Station or from the local control station, in the latter case by means of the PC inputs :LOPN and :LCLS. When several VALVECON instances are used, the superior PC program may use control mode MAN to enable/prevent operation of several valves. This PC program then switches the control mode of VALVECON to AUTO (by setting the PC input :AUTO high) when the local process is to take over control of the valve.

Control mode AUTO

The process controls the valve through the PC inputs :AOPN and :ACLS. The superior PC program is able to bring the valve to its home position through the PC inputs :OPEN or :CLOSE. The operator is able to bring the valve to its home position from Advant Station 500 Series Operator Station or from the local control station, in the latter case by means of the PC inputs :LOPN and :LCLS.

The PC inputs used for opening and closing in MAN mode are:

:OPEN	Order to open
:CLOSE	Order to close

The table below describes the function of these inputs comprehen- sively. :OPEN/ :CLOSE are inputs to a software SR flop-flop. The order that corresponds to the home position has the R (Reset) function and the one that takes the valve out of its home position has the S (Set) function. The corresponding PC inputs for the other points of control work in the same way.

1. :FINV=0. The home position is ‘Closed’.

:OPEN	:CLOSE	
0	0	No change
1	0	Order to open
0	1	Order to close
1	1	Order to close

2. :FINV=1. The home position is ‘Open’.

:OPEN	:CLOSE	
0	0	No change
1	0	Order to open
0	1	Order to close
1	1	Order to open

LOCAL

The valve is controlled from a local desk or panel. Control from other locations is blocked. LOCAL point of control, like other points of control, may be selected from Advant Station 500 Series Operator Station. In addition, LOCAL point of control may be selected from the local control station through the PC input :LE as follows:

LE= 1:	The point of control is LOCAL, as long as the Advant Station 500 Series Operator Station operator does not request TEST or STAND BY.
LE -> 0:	VALVECON resumes the latest point of control called for from Advant Station 500 Series Operator Station.

Control mode MAN

The operator controls the valve through the PC inputs :LOPN/ :LCLS.

Control mode AUTO

The process controls the valve through the PC inputs :AOPN/ :ACLS. The operator is able to bring the valve to its home position through the PC inputs :LOPN/ :LCLS.

The PC inputs used for opening and closing in control mode MAN are:

:LOPN	Local order to open
:LCLS	Local order to close

The function of these PC inputs is set out in tabular form below: :LOPN and :LCLS are inputs to a software SR flop-flop. The order that corresponds to the home position has the R (Reset) function and the one that takes the valve out of its home position has the S (Set) function. The corresponding PC inputs for the other points of control work in the same way.

1. :FINV=0. The home position is ‘Closed’.

:LOPN	:LCLS	
0	0	No change
1	0	Order to open
0	1	Order to close
1	1	Order to close

2. :FINV=1. The home position is ‘Open’.

:LOPN	:LCLS	
0	0	No change
1	0	Order to open
0	1	Order to close
1	1	Order to open

TEST

The valve is controlled from an operating station adjacent to the valve. The supervision of interlocks is limited. Only the safety interlocks IC1 and IC2 as well as external faults (the PC inputs :FLT1 and :FLT2) prevent operation. The process interlocks IB1- IB4 as well as the interlock IA have no effect. Control from other locations is blocked.

The control modes MAN and AUTO are not available in TEST. The valve is operated through the PC inputs :TOPN and :TCLS.

The PC inputs used for opening and closing are:

:TOPN	Order to open from field-mounted operating station
:TCLS	Order to close from field-mounted operating station

The function of these inputs is set out in tabular form below: :TOPN and :TCLS are inputs to a software SR flop-flop. The order that corresponds to the home position has the R (Reset) function and the one that takes the valve out of its home position has the S (Set) function. The corresponding PC inputs for the other points of control work in the same way.

1. :FINV=0. The home position is ‘Closed’.

:TOPN	:TCLS	
0	0	No change
1	0	Order to open
0	1	Order to close
1	1	Order to close

2. :FINV=1. The home position is ‘Open’.

:TOPN	:TCLS	
0	0	No change
1	0	Order to open
0	1	Order to close
1	1	Order to open

STANDBY

The valve is brought to its home position and all control orders are then disabled.

3.2.4 Control Modes

VALVECON supports the control modes MAN and AUTO, but only when the point of control is CENTRAL, SEQUENCE or LOCAL. Control mode may be selected by dialog in Advant Station 500 Series Operator Station or through the PC inputs :MAN and :AUTO. The latest order applies, with one exception: When the PC input :MAN is set high, AUTO cannot be selected by dialog.

The following table sets out the function of the PC inputs :MAN and :AUTO:

:MAN	:AUTO	
0	0	No change (results in MAN at start-up)
1	X	Manual mode requested
0	0 -> 1	Automatic mode requested
1 -> 0	1	Manual mode still requested

Control mode MAN

In MANual control mode, the valve may be operated directly from the current point of control (provided that the point of control is not STANDBY).

Control mode AUTO

In AUTO, the process controls the valve through the PC inputs of VALVECON, as follows:

:AOPN	AUTO order to open
:ACLS	AUTO order to close

In addition, the operator at the currently selected point of control is able to bring the valve to its home position. The same applies to the local operator.

The function of the inputs :AOPN and :ACLS is set out in tabular form below. :AOPN and :ACLS are inputs to a software SR flop-flop. The order that corresponds to the home position has the R (Reset) function and the one that takes the valve out of its home position has the S (Set) function. The corresponding PC inputs for control mode MAN work in the same way.

1. :FINV=0. The home position is ‘Closed’

:AOPN	:ACLS	
0	0	No change
1	0	Order to open
0	1	Order to close
1	1	Order to close

2. :FINV=1. The home position is ‘Open’

0	0	No change
1	0	Order to open
0	1	Order to close
1	1	Order to open

3.2.5 Open and Close Order at Different Points of Control and Control Modes

The table below describes the commands which can be given at the different control modes and points of control of VALVECON.

Table 3-1. Relation between commands and control modes and points of control

Order	**Central Man**	**Central Auto**	**Sequence Man**	**Sequence Auto**	**Local Man**	**Local Auto**	**Test**
Operator open	Open	Only to home position	Only to home position	Only to home position	–	–	–
Operator close	Close	Only to home position	Only to home position	Only to home position	–	–	–
PC input OPEN	–	–	Open	Only to home position	–	–	–
PC input CLOSE	–	–	Close	Only to home position	–	–	–
PC input LOPN	Only to home position	Only to home position	Only to home position	Only to home position	Open	Only to home position	–
PC input LCLS	Only to home position	Only to home position	Only to home position	Only to home position	Close	Only to home position	–
PC input AOPN	–	Open	–	Open	–	Open	–
PC input ACLS	–	Close	–	Close	–	Close	–
PC input TOPN	–	–	–	–	–	–	Open
PC input TCLS	–	–	–	–	–	–	Close

3.2.6 Control of Open/Close

Commands for opening and closing VALVECON may originate from dialog with Advant Station 500 Series Operator Station or from PC inputs, depending on the point of control selected. See Section 3.2.3 Points of Control, and Table 3-1.

When an open/close command is issued to VALVECON, it is forwarded to the valve through the following PC outputs:

1. :OPN/ :CLS issue continuous (static) signals for opening and closing, as long as the corresponding command applies.
2. :OPNP/ :CLSP issue pulsed signals for opening and closing. The pulse length depends on the setting of the PC input :T1. The shortest possible pulse length is determined by the execution cycle time for the PC program concerned.
3. :OPNL/ :CLSP generate continuous (static) signals for opening and closing, until the limit switches of the valve acknowledge the order through the PC inputs :LSOPN or :LSCLS.

Travelling time supervision

When the valve travels to the open position, it acknowledges the order to open. This is done by letting the ‘Closed’ limit switch reset the PC input :LSCLS to ‘0’, followed by the ‘Open’ limit switch eventually setting the PC input :LSOPN to ‘1’. The maximum permitted travelling time for the valve, measured as from issue of the order to open until :LSCLS resets and :LSOPN sets, is set on the PC input T2. Conversely, T2 also applies to travel in the opposite direction, i.e. from open to closed.

If the travelling time of the valve exceeds the limit set on T2, VALVECON issues an alarm signifying ‘Positional Error’. A Positional Error alarm is also raised if the valve subsequently, i.e. after expiry of T2, moves away from the requested position. The valve is deemed to be in the requested position when:

1. VALVECON issues an order to open, i.e. :OPN = 1. The :LSOPN limit switch is high and the :LSCLS low.
2. VALVECON issues an order to close, i.e. :CLS = 1 The :LSOPN limit switch is low and the :LSCLS high.

3.2.7 Fault Supervision

VALVECON supervises the following errors:

1. Supervision of external signals:

   FLT1 FLT1 is active when the PC input :FLT1 = 0
   FLT1 forces the valve to the home position

   FLT2 FLT2 is active when the PC input :FLT2 = 0
   FLT2 forces the valve to the home position

2. Internal errors in VALVECON:

   – Positional Error, Open (PEO)

     Supervises the travelling time of the valve from closed to open. Supervises that the open position is not abandoned inadvertently. See Section 3.2.6 Control of Open/Close.

   – Positional Error, Closed (PEC)

     Supervises the travelling time of the valve from open to closed. Supervises that the closed position is not abandoned inadvertently. See Section 3.2.6 Control of Open/Close.

3.2.8 Other Functions

VALVECON has the following miscellaneous functions:

- INTERMEDIATE POSITION (IPOS)

  When the valve is neither open nor closed, e.g. after receipt of an order to open, when the valve is en route to the open position, the limit switches of the valve, :LSOPN and :LSCLS, will both be low. In this situation, VALVECON sets the PC output :IPOS (Intermediate Position) high.

- NEW ORDER (NORD)

  The PC element sets the :NORD output high every time a new order to open or close is issued, i.e. on the outputs :OPN/ :OPNP/ :OPNL or :CLS/ :CLSP/ :CLSL. The duration of the signal equals the execution cycle time of the PC element itself.

- NOT INTERLOCKED (NOINT)

  The PC element sets the output :NOINT high every time the following conditions are satisfied:

  1. No interlocks are active
  2. No external errors (i.e. :FLT1=0 or FLT2=0) are present
  3. The point of control is not STAND BY.

- READY FOR OPERATION (RDY)

  The PC element sets the output :RDY high every time the following conditions are satisfied:

  1. No interlocks are active
  2. No external errors (i.e. :FLT1=0 or FLT2=0) are present
  3. The point of control is neither TEST, nor STANDBY.

3.2.9 Alarm Handling

The alarm handling for VALVECON can, via the data base element, be controlled individually for the different types of error which can occur. For example the alarm for one or both of the external faults FLT1 and FLT2 can be blocked.

If this blocking is to be permanent, suitable values are set at the data base element inputs I1_EVBLK and I2_EVBLK. If a dynamic blocking of certain alarms is required, for example depending on point of control, a suitable value can be created in PC and connected to the data base element inputs.

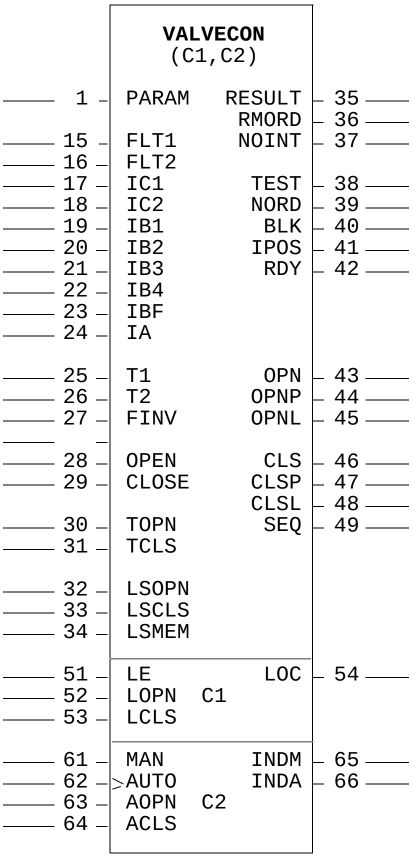
3.3 PC Element VALVECON

The information about the PC element in the functional unit VALVECON, its extension with call parameters and its connection description are given mainly in data sheet form. This data sheet is included in the manual *PC Elements Advant Controller 400 Series Reference Manual* in which all of the PC elements included in the Advant Controller 410/450 PC products are assembled.

Valve Control VALVECON

Summary

The PC element VALVECON forms part of the functional unit VALVECON (VALVE CONtroller). The element is used with the data base element VALVECON for controlling valves.



PC element VALVECON

Call VALVECON (C1, C2)

The element consists of a basic part which forms a complete basic valve controller. This function may be extended with optional extra functions with the call parameters C1 and C2 according to the table below.

Parameter	Significance	Permissible values
C1	Selection of function for local control	0 .. 1
C2	Selection of function for control mode AUTO	0 .. 1

Terminal Description

No	Name	Type	Description
1	PARAM	IA32	**PARAM**eter. Parameters from the object data base element VALVECON.
15	FLT1	IB	**F**au**LT 1**. Input for external error 1.
16	FLT2	IB	**F**au**LT 2**. Input for external error 2.
17	IC1	IB	**I**nterlock **C1**. Operation interlock (not deblockable).
18	IC2	IB	**I**nterlock **C2**. Operation interlock (not deblockable).
19	IB1	IB	**I**nterlock **B1**. Operation interlock(1)(2).
20	IB2	IB	**I**nterlock **B2**. Operation interlock(2).
21	IB3	IB	**I**nterlock **B3**. Start/Operation interlock(1)(2).
22	IB4	IB	**I**nterlock **B4**. Start/Operation interlock .
23	IBF	IB	**I**nterlock **B F**unction. Control input for IB3 and IB4. If IBF is set to 1 IB3 and IB4 works as start interlocks.
24	IA	IB	**I**nterlock **A**. Operation interlock(2).
25	T1	IT	**T**ime **1**. Input for time for OPEN/CLOSE pulse.
26	T2	IT	**T**ime **2**. Input for maximum travel time.
27	FINV	IB	**F**unction **INV**ersion. Input for home position. FINV=0 gives home position closed. FINV=1 gives home position open.
28	OPEN	IB	Input for open order.
29	CLOSE	IB	Input for close order.
30	TOPN	IB	**T**est **OP**e**N**. Input for open order in TEST mode.
31	TCLS	IB	**T**est **CL**o**S**e. Input for close order in TEST mode.
32	LSOPN	IB	**L**imit **S**witch **OP**e**N**. Input for limit position open.
33	LSCLS	IB	**L**imit **S**witch **CL**o**S**ed. Input for limit position closed.
34	LSMEM	IB	**L**imit **S**witch **MEM**ory. The function is not implemented.
35	RESULT	OA12	Output for results to the data base element VALVECON.

Terminal Description

No	Name	Type	Description
36	RMORD	OI	**R**eset **M**anual **ORD**er. Output for resetting operation order in the object data base element VALVECON.
37	NOINT	OB	**NO INT**erlock. Output which is set to 1 when the object is not interlocked and no external fault reasons (FLT1 or FLT2) exist.
38	TEST	OB	Output for indication of point of control TEST.
39	NORD	OB	**N**ew **ORD**er. Output for open/close order (pulse).
40	BLK	OB	**BL**oc**K**ed. Output which is set to 1 when the point of control is STANDBY.
41	IPOS	OB	Intermediate **POS**ition. Output for indication of intermediate position.
42	RDY	OB	**R**ea**DY**. Output for ready indication.
43	OPN	OB	**OP**e**N**. Continuous output for OPEN.
44	OPNP	OB	**OP**e**N** **P**ulse. Pulse output for OPEN (pulse during time T1).
45	OPNL	OB	**OP**e**N** **L**imit. Output for OPEN which is deactivated when LSOPN has been reached.
46	CLS	OB	**CL**o**S**e. Continuous output for CLOSE.
47	CLSP	OB	**CL**o**S**e **P**ulse. Pulse output for CLOSE (pulse during time T1).
48	CLSL	OB	**CL**o**S**e **L**imit. Output for CLOSE which is deactivated when LSCLS has been reached.
49	SEQ	OB	Indication of point of control **SEQ**uence.
51(3)	LE	IB	**L**ocal **E**nable. Input for selecting point of control LOCAL.
52(3)	LOPN	IB	**L**ocal **OP**e**N** order. Input for local open order.
53(3)	LCLS	IB	**L**ocal **CL**o**S**e order. Input for local close order.
54(3)	LOC	OB	**LOC**al. Indication of point of control LOCAL.
61(4)	MAN	IB	**MAN**ual. Input for switching to control mode MAN.
62(4)	AUTO	IB	**AUTO**matic. Input for switching to control mode AUTO. Dynamic input.
63(4)	AOPN	IB	**A**uto **OP**e**N**. Input for auto open order.
64(4)	ACLS	IB	**A**uto **CL**o**S**e. Input for auto close order.
65(4)	INDM	OB	**IND**ication **M**anual. Output for indication of control mode MAN
66(4)	INDA	OB	**IND**ication **A**uto. Output for indication of control mode AUTO.

(1) May be disabled via operator dialog
(2) Disabled in operation mode TEST
(3) These terminals are selected with the call parameter C1.
(4) These terminals are selected with the call parameter C2.

3.3.1 Connections to Data Base Elements

The PC element VALVECON is intended for connection to the data base element VALVECON. The following connections are made in the PC program to transmit information between the PC element and the data base element.

Table 3-2. Connections to data base elements

No	Name	Terminals in the data base element
1	PARAM	PC_PARM
35	RESULT	PC_RES
36	RMORD	MORD

Data base terminal PC_PARM

PC_PARM is a block term which transfers operator’s orders to the PC element. It consists of the following orders.

Table 3-3. Operator’s orders from the data base element PC_PARM

Name	Use
MORD_00	Point of control switch-over to LOCAL
MORD_01	Point of control switch-over to TEST
MORD_02	Point of control switch-over to STANDBY
MORD_03	Point of control switch-over to CENTRAL
MORD_04	Control mode switch-over to AUTO
MORD_05	Control mode switch-over to MAN
MORD_06	Blocking of interlocking IB1 and IB3
MORD_07	Deblocking
MORD_08	Open
MORD_09	Close
MORD_10	Point of control switch-over to SEQUENCE

Data base terminal PC_RES

PC_RES is a block term in which indications from the PC element are stored. It consists of the terminals IND1 and IND2. IND1 and IND2 each consists, in turn, of 16 indications.

Table 3-4. Operator’s orders from the data base element PC_RES

Name	Use
IND1_00	External fault 1
IND1_01	External fault 2
IND1_02	Position error open
IND1_03	Position error closed
IND1_04	Limit passed
IND1_07	Limit switch for open position
IND1_08	Collective fault indication
IND1_09	Collective unacknowledged fault indication
IND1_11	Limit switch closed position
IND1_12	Open
IND1_13	Close
IND1_15	Intermediate position
IND2_00	Blocked IB1 and IB3
IND2_01	Point of control LOCAL
IND2_02	Point of control TEST
IND2_03	Point of control STANDBY
IND2_04	Point of control SEQUENCE
IND2_05	Control mode AUTO=1/MANUAL=0
IND2_07	Ready to run
IND2_08	Active interlocking IC1
IND2_09	Active interlocking IC2
IND2_10	Active interlocking IB1
IND2_11	Active interlocking IB2
IND2_12	Active interlocking IB3
IND2_13	Active interlocking IB4
IND2_14	Active interlocking IA

Data base terminal MORD

The PC connection RMORD resets terminal MORD in the data base element VALVECON. This means that orders from the operator are reset to zero when read and executed by the PC element.

3.4 Data Base Element VALVECON

Information about the data base element in the functional unit VALVECON is given in data sheet form. This data sheet is included in the manual *Data Base Elements Advant Controller 400 Series Reference Manual* in which all of the data base elements included in the Advant Controller 410/450 products are assembled.

Valve Control VALVECON

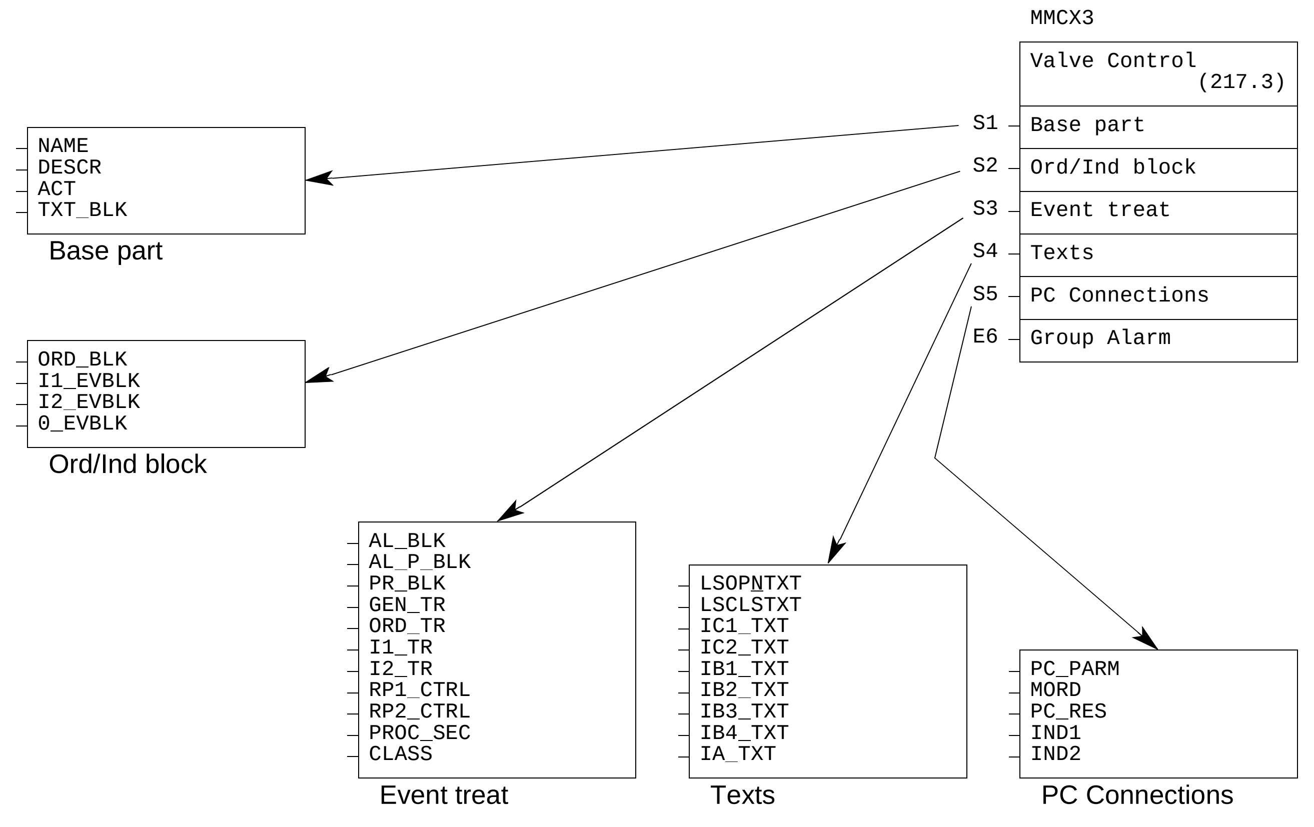
Summary

The Valve Control data base element is used to build Advant Station 500 Series Operator Station functions for the VALVECON function unit. Some static information is given.

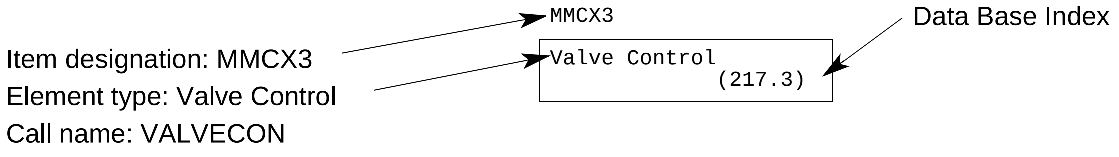
Parameters that can be changed from the dialog can be given start values.

For information about the extension parts of Group Alarm see data base element Group Member.

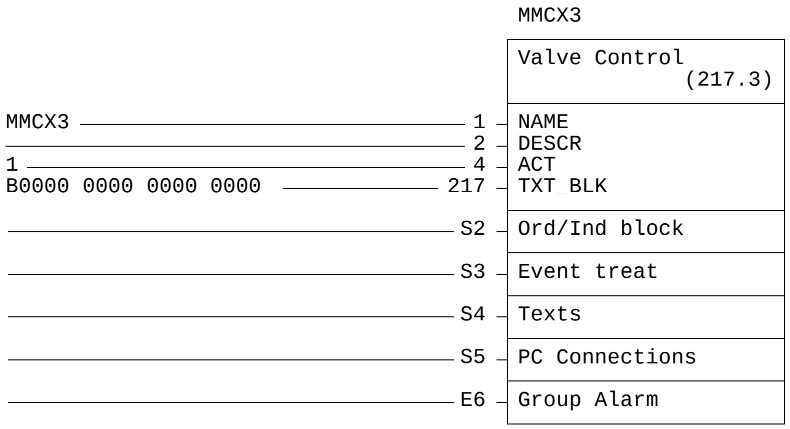
Overview



Head



Base part



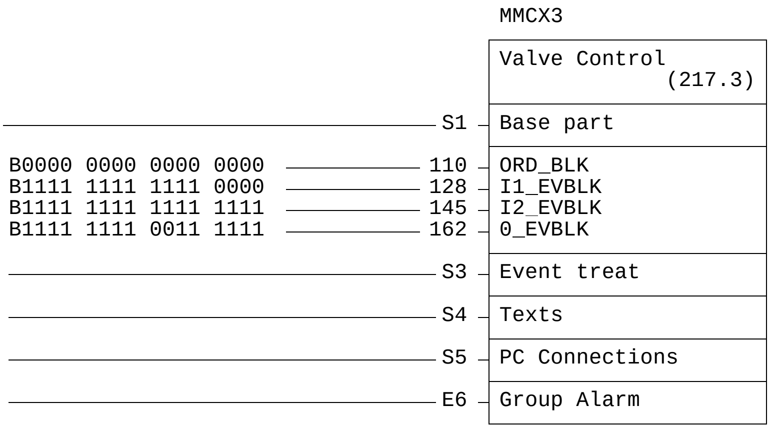
Terminal Description, Base part

Termi-nal No	Terminal Name	Value entered by	Default value	PC con-nection data type	Description	Remarks
1	NAME	user	MMCXx	–	Each object must be given a unique **NAME**, e.g. ABC 123.	Max. 20 characters. Spaces are not allowed.
2	DESCR	user	–	–	**DESCR**iption of the object that is shown in Operator Station.	Max. 20 characters. Any information regarding the object may be entered.
4	ACT	user	1	B(r/w)	1=Operator communication is **ACT**ive.	0=Communication is blocked and events are not updated.

Terminal Description, Base part (Continued)

Terminal No	Terminal Name	Value entered by	Default value	PC connection data type	Description	Remarks		
						Text	Bit value	Def. Hex. value
217	TXT_BLK	user	H’0000	I(r/w)	**T**e**XT BL**oc**K** is used to remove unused fixed error texts from the object picture. All available texts are represented by a flag in TXT_BLK. A set flag indicates a blocked text. The default value have no set flags. The TXT_BLK table shows how to compute the TXT_BLK value.	Fault 1	1	0
						Fault 2	2	
						Not used	4	
						Not used	8	
						Not used	1	0
						Not used	2	
						Not used	4	
						Not used	8	
						Not used	1	0
						Not used	2	
						Not used	4	
						Not used	8	

Ord/Ind block



Terminal Description, Ord/Ind block

Termi-nal No	Terminal Name	Value entered by	Default value	PC con-nection data type	Description	Remarks		
						Text	Bit value	Def. Hex. value
110	ORD_BLK	user	H’0000	I(r/w)	**BL**oc**K**ing of manual **ORD**ers. Always available orders are represented by a flag in ORD_BLK. A set flag indicates a blocked order. The default value contains no set flags. The ORD_BLK table shows how to compute the ORD BLK value.	Local	1	0
						Test	2	
						Standby	4	
						Central	8	
						Auto	1	0
						Man	2	
						Blocking of interlocks IB1 and IB3	4	
						Deblocking	8	
						Open	1	0
						Close	2	
						Sequence	4	
						Not used	8	
						Not used	1	0
						Not used	2	
						Not used	4	
						Not used	8	

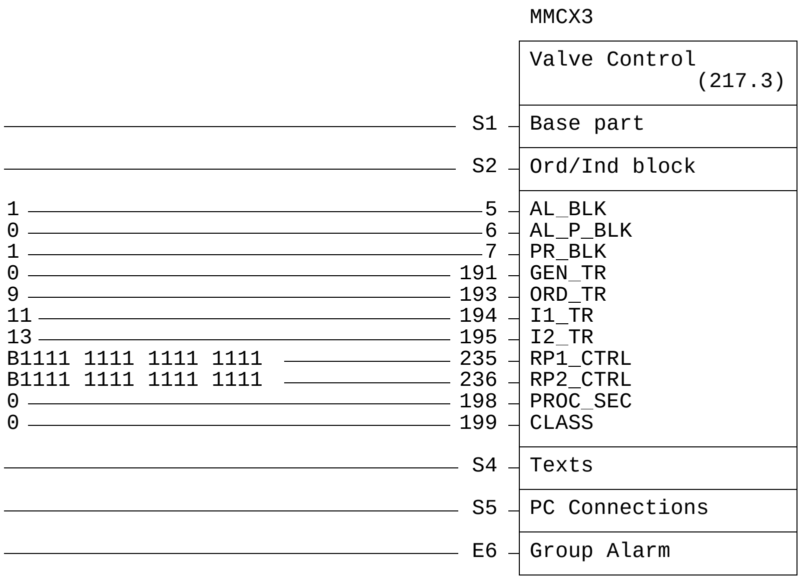
Terminal Description, Ord/Ind block (Continued)

Terminal No	Terminal Name	Value entered by	Default value	PC connection data type	Description	Remarks		
128	I1_EVBLK	user	H'FFF0	I(r/w)	**BL**oc**K**ing of **I**ndication **EV**ents **1**. All available events are represented by a flag in I1_EVBLK. A set flag indicates a blocked event. The default value is set to block all events at indication that are not normally error indications. The I1_EVBLK table shows how to compute the I1 EVBLK value.	Text	Bit value	Def. Hex. value
						External error 1	1	0
						External error 2	2	
						Position error open	4	
						Position error close	8	
						Always 1	1	F
						Always 1	2	
						Always 1	4	
						Limit switch open	8	
						Always 1	1	F
						Always 1	2	
						Always 1	4	
						Limit switch close	8	
						Always 1	1	F
						Always 1	2	
						Always 1	4	
						Intermediate position	8	

Terminal Description, Ord/Ind block (Continued)

Terminal No	Terminal Name	Value entered by	Default value	PC connection data type	Description	Remarks		
145	I2_EVBLK	user	H'FFFF	I(r/w)	**L**oc**K**ing of **I**ndication **EV**ents **2**. All available events at indication are represented by flag in I2_EVBLK. A set flag indicates a blocked event. The default value is set to block all events. The I2_EVBLK table shows how to compute the I2_EVBLK value.	Text	Bit value	Def. Hex. value
						Always 1	1	F
						Local	2	
						Test	4	
						Standby	8	
						Sequence	1	F
						Auto/Manual	2	
						Always 1	4	
						Always 1	8	
						Active interlock IC1	1	F
						Active interlock IC2	2	
						Active interlock IB1	4	
						Active interlock IB2	8	
						Active interlock IB3	1	F
						Active interlock IB4	2	
						Active interlock IA	4	
						Always 1	8	
162	O_EVBLK	user	H'FF3F	–	**BL**oc**K**ing of manual **O**rders **EV**ents. All available events are represented by a flag in O_EVBLK. A set flag indicates a blocked event. The default value is set to block all events except interlock blocking. The O_EVBLK value is computed in the same way as the ORD_BLK value and uses the same table.	The function is not implemented in Operator Station.		

Event treat



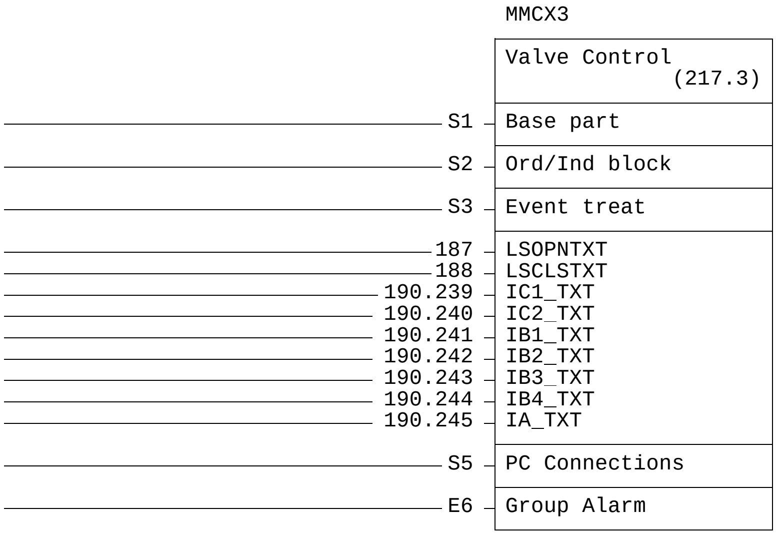
Terminal Description, Event treat

Terminal No	Terminal Name	Value entered by	Default value	PC connection data type	Description	Remarks
5	AL_BLK	dialog	1	–	Flag for **BL**oc**K**ing of **AL**arm indication and event handling in Operator Station.	–
6	AL_P_BLK	system	0	B(r/w)	**AL**arm **P**eriod **BL**oc**K** flag for temporary blocking of alarm indication and event handling in Operator Station by PC program.	–
7	PR_BLK	dialog	1	–	Flag for **BL**oc**K**ing of **PR**intout in Operator Station.	–
191	GEN_TR	user	0	–	The **GEN**eral **TR**eatment terminal assigns item numbers for event handling of ALARM BLocK orders and PRINT BLocK orders.	Function not implemented in Operator Station.
193	ORD_TR	user	9	–	The manual **ORD**er **TR**eatment terminal assigns item numbers for event handling of manual orders MORD_00..MORD_15.	Function not implemented in Operator Station.
194	I1_TR	user	11	–	The **I**ndication **TR**eatment **1** terminal assigns terminal numbers for event handling of changes in IND1.	–

Terminal Description, Event treat (Continued)

Termi-nal No	**Terminal Name**	**Value entered by**	**Default value**	**PC con-nection data type**	**Description**	**Remarks**
195	I2_TR	user	13	–	The **I**ndication **TR**eatment **2** terminal assigns terminal numbers for event handling of changes in IND2.	–
235	RP1_CTRL	user	H'FFFF	–	Every bit of the value **R**e**P**eat **C**on**TR**oL error in the corresponding bit of the IND**1**.	Uses the same bit-table as I1_EVBLK.
236	RP2_CTRL	user	H'FFFF	–	Every bit of the value **R**e**P**eat **C**on**TR**oL error in the corresponding bit of the IND**2**.	Uses the same bit-table as I2_EVBLK.
198	PROC_SEC	user	0	I(r/w)	**PROC**ess **SEC**tion is used for sectioning the alarm handling. Section numbers 1-16. 0=no sectioning. The signal may be presented in lists –1=the signal cannot be selected and cannot be presented in lists.	–
199	CLASS	user	0	I(r/w)	**CLASS** subdivides process section. Used by status list function in Operator Station.	–

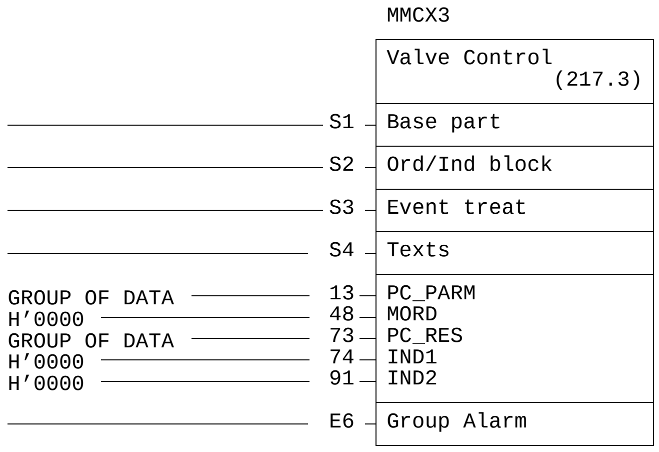
Texts



Terminal Description, Texts

Terminal No	Terminal Name	Value entered by	Default value	PC connection data type	Description	Remarks
187	LSOPNTXT	user	–	–	**T**e**XT** to be presented when **LSOPN** input of the PC element is TRUE.	Max. 10 characters.
188	LSCLSTXT	user	–	–	**T**e**XT** to be presented when **LSCLS** input of the PC element is	Max. 10 characters.
190.239	IC1_TXT	user	–	–	**T**e**XT** to be presented when **IC1** input of the PC element is TRUE.	Highest priority. Max. 17 characters.
190.240	IC2_TXT	user	–	–	**T**e**XT** to be presented when **IC2** input of the PC element is FALSE.	Max. 17 characters.
190.241	IB1_TXT	user	–	–	**T**e**XT** to be presented when **IB1** input of the PC element is FALSE.	Max. 17 characters.
190.242	IB2_TXT	user	–	–	**T**e**XT** to be presented when **IB2** input of the PC element is FALSE.	Max. 17 characters.
190.243	IB3_TXT	user	–	–	**T**e**XT** to be presented when **IB3** input of the PC element is FALSE.	Max. 17 characters.
190.244	IB4_TXT	user	–	–	**T**e**XT** to be presented when **IB4** input of the PC element is FALSE.	Max. 17 characters.
190.245	IA_TXT	user	–	–	**T**e**XT** to be presented when **IA** input of the PC element is FALSE.	Lowest priority. Max. 17 characters.

PC Connections



Terminal Description, PC Connections

Terminal No	Terminal Name	Value entered by	Default value	PC connection data type	Description	Remarks
13	PC_PARM	system	–	A32(r/w)	The **PC PAR**a**M**eters terminal contains group data to be connected to the PARAM terminal of the VALVECON PC element.	–
48	MORD	dialog/PC	–	I(r/w)	Group data for **M**anual **ORD**ers from the operator. Connected to the RMORD terminal of the VALVECON PC element.	–
73	PC_RES	PC	–	A12(r/w)	The **PC RES**ult terminal contains group data to be connected to the RESULT terminal of the VALVECON PC element.	–
74	IND1	PC via PC_RES	–	I(r/w)	The **IND**ication **1** terminal contains status indications received via PC_RES from PC.	–
91	IND2	PC via PC_RES	–	I(r/w)	The **IND**ication **2** terminal contains status indications received via PC_RES from PC.	–

3.5 Operator Functions

The function is divided in principle into 3 parts:

- Presentation (Display elements, Time logged properties)
- Dialog
- Event handling

3.5.1 Presentation

Display elements which can be used for different display types are available for use in the functional unit VALVECON.

The display elements show the status and the controls of the process with different degrees of detail and is intended for the following displays:

- Object display
- Group display
- Object closeup display
- Process display

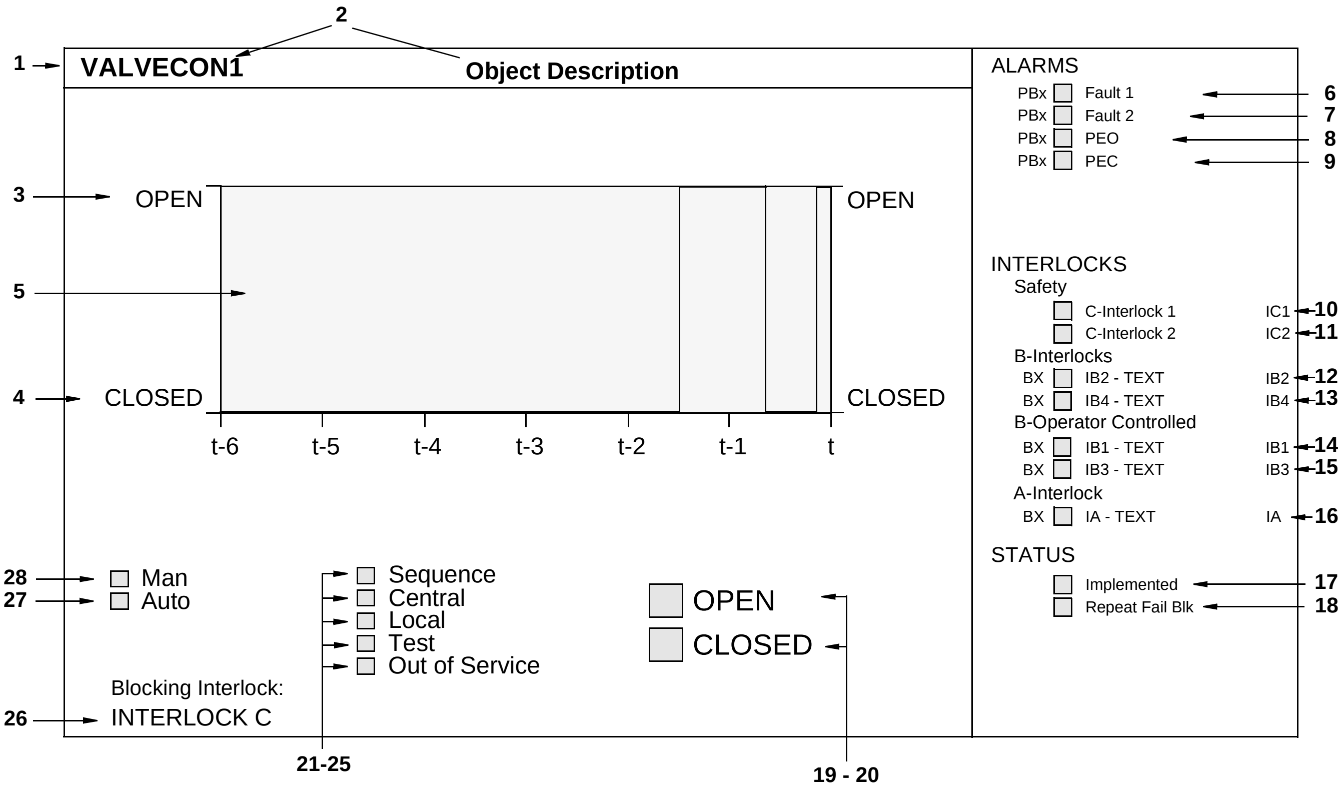
Examples of different display elements which could be used in these displays are given in the following section. A complete list of the prepared elements available is provided in the manual *AdvaCommand User Interface Reference Manual.*

Detailed information of alternative way of presentation of certain status and data within the displays such as color, flashing, blocked etc. is given in the reference manual.

Time-logged Properties

Measured values stored can be presented graphically in the form of curves on the display screen. Such a display, a **trend display**, can consist of 1-4 curves. The valve position can be presented in VALVECON. The logged property is designated VALVP.

Object display: VALOB01

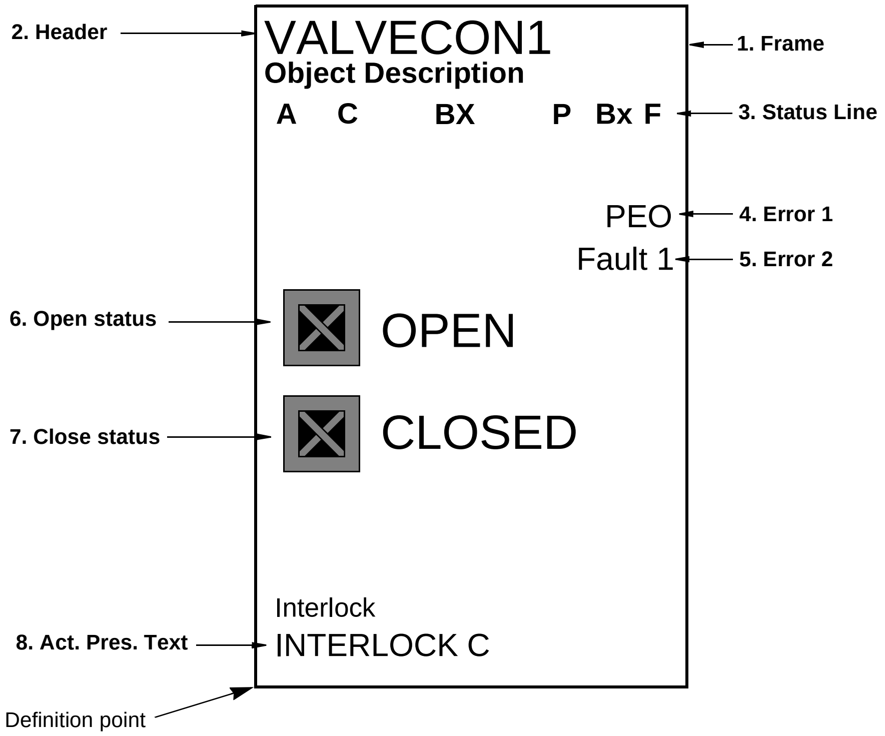


No	Description	Remarks
1	SelectFrame	
2	Header	Object name and description
3	Range Max	
4	Range Min	
5	Trim Curve	
6	ALARMS	
6.1	Printout Blocked	
6.2	Alarm Blocked	
6.3	Warning Indication	Unacknowledged alarm
6.4	Alarm 1 Text	User defined Fault 1
7.1	Printout Blocked	
7.2	Alarm Blocked	
7.3	Warning Indication	Unacknowledged alarm
7.4	Alarm 2 Text	User defined Fault 2
8.1	Printout Blocked	
8.2	Alarm Blocked	
8.3	Warning Indication	Unacknowledged alarm
8.4	Alarm 3 Text	PEO Position Error Open
9.1	Printout Blocked	
9.2	Alarm Blocked	
9.3	Warning Indication	Unacknowledged alarm
9.4	Alarm 4 Text	PEC Position Error closed
10	INTERLOCKS	
10.1	IC1 Active	Safety Interlock IC1 active

No	Description	Remarks
10.2	IC1 Text	Safety Interlock IC1
11.1	IC2 Active	Safety Interlock IC2 active
11.2	IC2 Text	Safety Interlock IC2
12.1	IB2 Blocked	Test mode. Interlock blocked
12.2	IB2 Active	Interlock IB2 active
12.3	IB2 Text	Interlock text IB2
13.1	IB4 Blocked	Test mode. Interlock blocked
13.2	IB4 Active	Interlock IB4 active
13.3	IB4 Text	Interlock IB4 text
14.1	IB1 Blocked	Interlock blocked
14.2	IB1 Active	Interlock IB1 active
14.3	IB1 Text	Interlock IB1 text
15.1	IB3 Blocked	Interlock blocked
15.2	IB3 Active	Interlock IB3 active
15.3	IB3 Text	Interlock IB3
16.1	IA Blocked	Test mode. Interlock blocked
16.2	IA Active	Interlock IA active
16.3	IA Text	Interlock IA text
17	STATUS	
17.1	Implemented Indication	
17.2	Implemented Text	
18.1	Repeat Fail Blocked Indication	The valve can be controlled

No	Description	Remarks
18.2	Repeat Fail Blocked Text	
19.1	Valve Open Status	
19.2	Valve Open Text	User defined text
20.1	Valve Close Status	
20.2	Valve Close Text	User defined text
21.1	Sequence Indication	Controlled from groupstart
21.2	Sequence Text	
22.1	Central Indication	Controlled from operator’s place
22.2	Central Text	
23.1	Local Indication	Controlled from local panel
23.2	Local Text	
24.1	Test Indication	Jog running from motor place
24.2	Test Text	
25.1	Out of Service Indication	No control possible
25.2	Out of Service Text	
26.1	Blocking Interlock Text	
26.2	Actual Interlock Text	
27.1	Auto Indication	Auto mode. Process conditions control start/stop of motor
27.2	Auto Text	
28.1	Man Indication	Manual mode. Starorder affects the motor directly
28.2	Man Text	

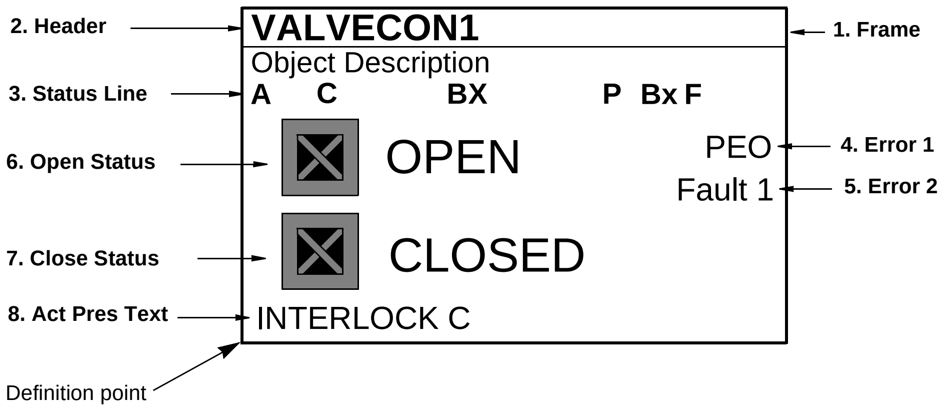
Display Element for Group display: VALGR01



No	Description	Remarks
1	SelectFrame	
2	Header	Object name and description
3	Status Line	
3.1	Mode	
3.2	Point Of Control	
3.3	Interlock Indication	
3.4	Printout Blocked	
3.5	Alarm Blocked	
3.6	Fault Indication	

No	Description	Remarks
4	Error 1	
5	Error 2	
6.1	Valve Open Status	
6.2	Valve Open Text	User defined text
7.1	Valve Close Status	
7.2	Valve Close Text	User defined text
8.1	Interlock Text	
8.2	Act Pres Text	

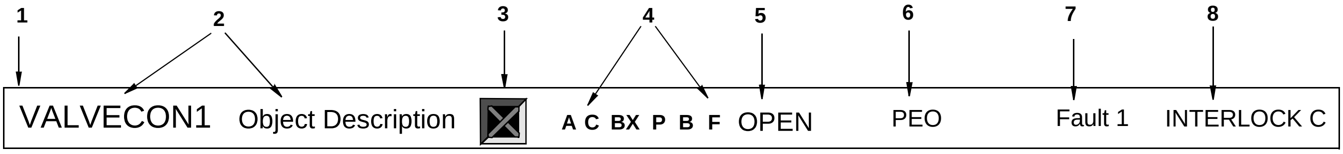
Display Element for Object closeup display: VALWI01



No	Description	Remarks
1	SelectFrame	
2	Header	Object name and description
3	Status Line	
3.1	Mode	
3.2	Point Of Control	
3.3	Interlock Indication	
3.4	Printout Blocked	
3.5	Alarm Blocked	

No	Description	Remarks
3.6	Fault Indication	
4	Error 1	
5	Error 2	
6.1	Valve Open Status	
6.2	Valve Open Text	User defined text
7.1	Valve Close Status	
7.2	Valve Close Text	User defined text
8	Act Pres Text	

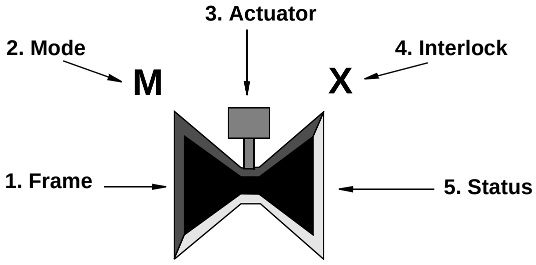
Display Element for Process display: VALSG01



No	Description	Remarks
1	SelectFrame	
2	Header	Object name and description
3	Valve Open Status	
4	Status Indication	
4.1	Mode	
4.2	Point Of Control	
4.3	Interlock Indication	
4.4	Printout Blocked	

No	Description	Remarks
4.5	Alarm Blocked	
4.6	Fault Indication	
5	Valve Open Text	
	Valve Closed Text	
6	Error 1	
7	Error 2	
8	Act Pres Text	

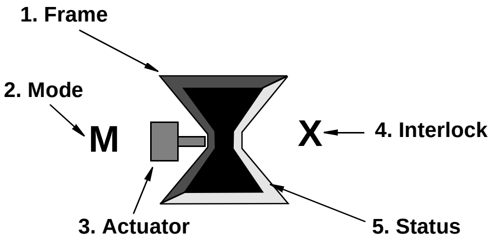
VALPD01



No	Description	Remarks
1	SelectFrame	
2	Mode or Control point	
3	Actuator Indication	

No	Description	Remarks
4	Interlock Indication	
5	Valve Status	

VALPD02



No	Description	Remarks
1	SelectFrame	
2	Mode or Control point	
3	Actuator Indication	

No	Description	Remarks
4	Interlock Indication	
5	Valve Status	

3.5.2 Dialog

The display screen is supplemented with a keyboard for operator communication with the functional unit/object.

The dialog is built up using both fixed and dynamic keys. The functions available with the dynamic keys are presented in a pattern of rectangles on the lower part of the display screen when the object is selected. The functional unit VALVECON has a MIN dialog (Production level) and a MAX dialog (Maintenance level). The MIN dialog consists of an output dialog with 1 subdialog. The MAX dialog consists of an output dialog with 2 subdialogs.

MIN dialog (No authority key)

Keyboard keys

Man	**Man**	Set to manual mode
Auto	**Auto**	Set to automatic mode
◇	**Open**	Open valve
▽	**Close**	Close valve
✓	**Acknowledge**	Acknowledge alarm
Object	**Object Display**	Select Object Display
📈	**Object Trend**	Select Object Trend
Dialog	**Previous Level**	Select Top Level dynamic keys

Dynamic keys, Top Level

D1 Sequence	D2 Central	D3 Local	D4	D5
D6	D7	D8	D9	D10 *Keyboard…*

Sequence	Set control to Sequence
Central	Set control to Central
Local	Set control to Sequence
Keyboard…	Select Dynamic keys: Keyboard

Dynamic keys, Keyboard

D1 ■ Open	D2 Man	D3 Auto	D4	D5
D6 □ Close	D7 Acknowledge	D8 Object Display	D9 Object Trend	D10

Open	Open valve
Man	Manual mode
Auto	Automatic mode
Close	Close valve
Acknowledge	Acknowledge alarm
Object Display	Select object display
Object Trend	Select object trend

MAX dialog (Authority key)

Keyboard keys

Man	**Man**	Manual mode
Auto	**Auto**	Automatic mode
◇	**Open**	Open valve
▽	**Close**	Close valve
✓	**Acknowledge**	Acknowledge alarm
Object	**Object Display**	Select object display
📈	**Object Trend**	Select object trend
Dialog	**Previous Level**	Select top level dynamic keys
Dialog	**Next Block**	Page between the dynamic key sets (Keyboard and Block)

Dynamic keys, Top Level

D1 Sequence	D2 Central	D3 Local	D4 Test	D5 Our of Service
D6	D7	D8 *Block…*	D9	D10 *Keyboard…*

Sequence	Set control to Sequence
Central	Set control to Central
Local	Set control to Local
Test	Set control to Test
Out of Service	Set control to Out of Service
Block…	Select Dynamic keys: Block
Keyboard…	Select Dynamic keys: Keyboard

Dynamic keys, Keyboard…

D1 ■ Open	D2 Man	D3 Auto	D4	D5
D6 □ Close	D7 Acknowledge	D8 Object Display	D9 Object Trend	D10

Open	Open valve
Man	Set to manual mode
Auto	Set to automatic mode
Close	Close valve
Acknowledge	Acknowledge alarm
Object Display	Select Object Display
Object Trend	Select Object Trend

Dynamic keys, Block…

D1	D2 Block Alarm	D3 Block Printout	D4	D5 Override Interlock
D6	D7 Deblock Alarm	D8 Deblock Printout	D9	D10 Normal Interlock

Block Alarm	Block alarm indication
Block Printout	Block event printout
Override Interlock	Override interlocking
Deblock Alarm	Deblock alarm indication
Deblock Printout	Deblock event printout
Normal Interlock	Interlocking

3.5.3 Event Handling

General

This chapter contains a description of all alarms and events in the functional unit VALVECON. The event texts are also given in the manual *AdvaCommand Basic Functions User's Guide*.

Figure 3-4 shows diagrammatically the relation between indica- tions and the parameters which can be used to block event handling for certain indications and points out a required handling in the operator's station.

The possibilities of the operator to block event printouts and alarms are shown under the heading 'Event and alarm blocking' below.

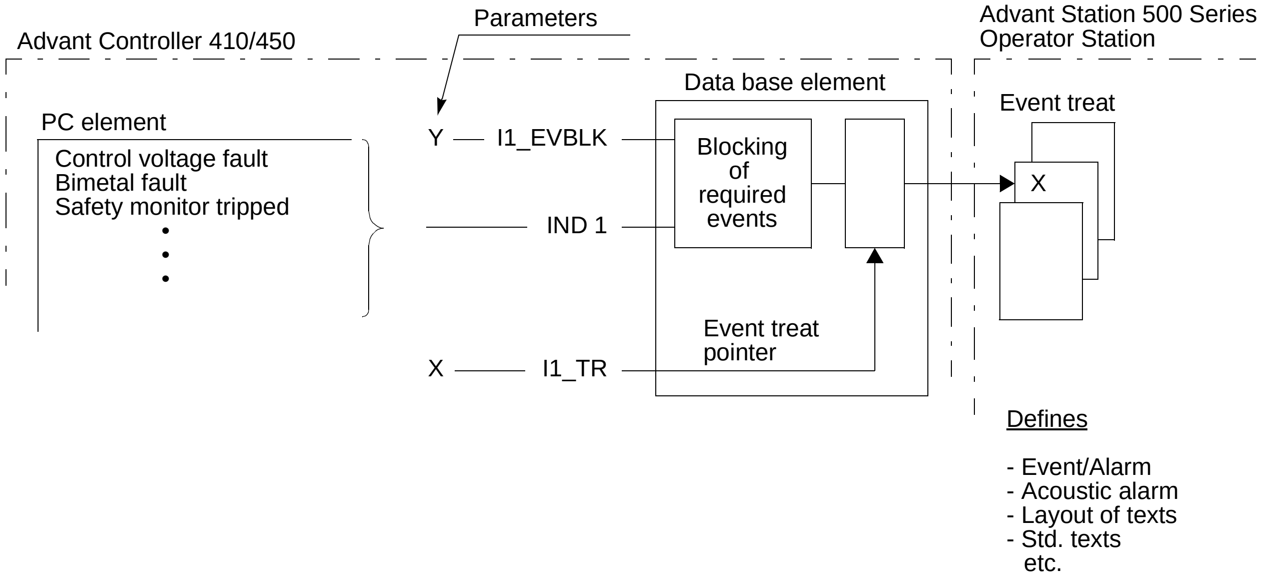


Figure 3-4. Examples of event handling of indications is controlled by parameters

The events are divided into groups. One pointer is allocated to each group which means that the individual events of the group are, in several respects, handled in the same way in Advant Station 500 Series Operator Station. For each group different handling can be selected for status changes 0-->1 and 1-->0 respectively. The texts which are written out in different lists are individual for each event. The group division -which events are associated with the pointer- is given in 'Event description with standard texts' below. This also specifies which event handling is obtained as default and which alternative standard functions are available.

Table 3-5. Event Texts for VALVECON

Signal[1]	**Events**	**Event Treat pointer**	**Property text**		**Event text**	
			Standard text	**Line No in Event Treat**	**Standard text**	**Line No in Event Treat**
IND1_00	User defined Fault 1 coming	I1_TR	F1	1	Alarm	1
IND1_00	User defined Fault 1 passing	I1_TR	F1	1	Normal	2
IND1_01	User defined Fault 2 coming	I1_TR	F2	2	Alarm	1
IND1_01	User defined Fault 2 passing	I1_TR	F2	2	Normal	2
IND1_02	Position error open coming	I1_TR	PosErrO	3	Alarm	1
IND1_02	Position error open passing	I1_TR	PosErrO	3	Normal	2
IND1_03	Position error closed coming	I1_TR	PosErrC	4	Alarm	1
IND1_03	Position error closed passing	I1_TR	PosErrC	4	Normal	2
IND1_07	Valve in open position	I1_TR	Pos O	8	Alarm	1
IND1_07	Valve changes from open position	I1_TR	Pos O	8	Normal	2
IND1_11	Valve in closed position	I1_TR	Pos C	12	Alarm	1
IND1_11	Valve changes from closed position	I1_TR	Pos C	12	Normal	2
IND1_15	Valve in intermediate position	I1_TR	IntPos	16	Alarm	1
IND1_15	Valve not in intermediate position	I1_TR	IntPos	16	Normal	2
IND2_01	Control mode Local On	I2_TR	Local	2	On	1
IND2_01	Control mode Local Off	I2_TR	Local	2	Off	2
IND2_02	Control mode Test On	I2_TR	Test	3	On	1
IND2_02	Control mode Test Off	I2_TR	Test	3	Off	2
IND2_03	Control mode Standby On	I2_TR	Standby	4	On	1

Table 3-5. Event Texts for VALVECON (Continued)

Signal[1]	**Events**	**Event Treat pointer**	**Property text**		**Event text**	
			Standard text	**Line No in Event Treat**	**Standard text**	**Line No in Event Treat**
IND2_03	Control mode Standby Off	I2_TR	Standby	4	Off	2
IND2_04	Control mode Sequence On	I2_TR	Sequence	5	On	1
IND2_04	Control mode Sequence Off	I2_TR	Sequence	5	Off	2
IND2_05	Op. mode Auto On	I2_TR	Auto	6	On	1
IND2_05	Op. mode Auto Off	I2_TR	Auto	6	Off	2
IND2_08	Interlock IC1 On	I2_TR	CInterl1	9	On	1
IND2_08	Interlock IC1 Off	I2_TR	CInterl1	9	Off	2
IND2_09	Interlock IC2 On	I2_TR	CInterl2	10	On	1
IND2_09	Interlock IC2 Off	I2_TR	CInterl2	10	Off	2
IND2_12	Interlock IB1 On	I2_TR	BInterl1	13	On	1
IND2_12	Interlock IB1 Off	I2_TR	BInterl1	13	Off	2
IND2_13	Interlock IB2 On	I2_TR	BInterl2	14	On	1
IND2_13	Interlock IB2 Off	I2_TR	BInterl2	14	Off	2
IND2_10	Interlock IB3 On	I2_TR	BInterl3	11	On	1
IND2_10	Interlock IB3 Off	I2_TR	BInterl3	11	Off	2
IND2_11	Interlock IB4 On	I2_TR	BInterl4	12	On	1
IND2_11	Interlock IB4 Off	I2_TR	BInterl4	12	Off	2
IND2_14	Interlock IA On	I2_TR	AInterl	15	On	1
IND2_14	Interlock IA Off	I2_TR	AInterl	15	Off	2

(1) This column is unique for this manual. It is not included in the manual “AdvaCommand Basic Functions User’s Guide”.

Event and alarm blocking

In addition to the configurable blocking facilities described under the heading ‘General’, the operator at Advant Station 500 Series Operator Station can block the listed event and alarm handling. Special commands are available.

Table 3-6. Special blocking commands

Dialog Key	Event- and Alarm handling blocked for signals	Remark
BLK ALARM (Block alarm)	All signals IND1_XX and IND2_XX	–
BLK PRINT (Block print)	All signals IND1_XX and IND2_XX	Blocks printout on printer only

3.5.4 Text Handling

Each interlocking can be associated to a descriptive text of maxi- mum 17 characters. These texts are implemented with the data base element and they are presented on various displays in Advant Station 500 Series Operator Station. For A and B interlockings the texts are always presented on the right hand part of the object display. If one or several of the interlockings are active the text valid for the interlocking with highest priority is copied to the property ACT_PRES_TEXT in the data base. This property is presented on the object display, the motor group display and the window display used in the process displays.

The text is presented in yellow colour if the object in question is ready for start else in red color. The priority is in order IC1, IC2, IB1, IB2, IB3, IB4, IA from higher to lower priority. When no interlocking is valid the text is cleared out.

3.6 Application Examples

3.6.1 Example 1

Description

On/off control of a valve. The solution is completely based on the basic function of the VALVECON element with C1 and C2 as optional additions.

Comments to the overview diagram

External Errors. Interlockings

If there are no interlockings, the interlocking inputs on the PC element are set to 1.

External close. Group start

The open and close inputs are reset to zero.

BLK, RDY and LSOPEN can be used if the valve is included in a group start.

Time settings

Show suitable values at T1 and T2.

I/O Connections

DO MV is connected to, for example, the coil in a solenoid.

DI LSO is connected to a limit switch which indicates an open valve.

DI LSC is connected to a limit switch which indicates a closed valve.

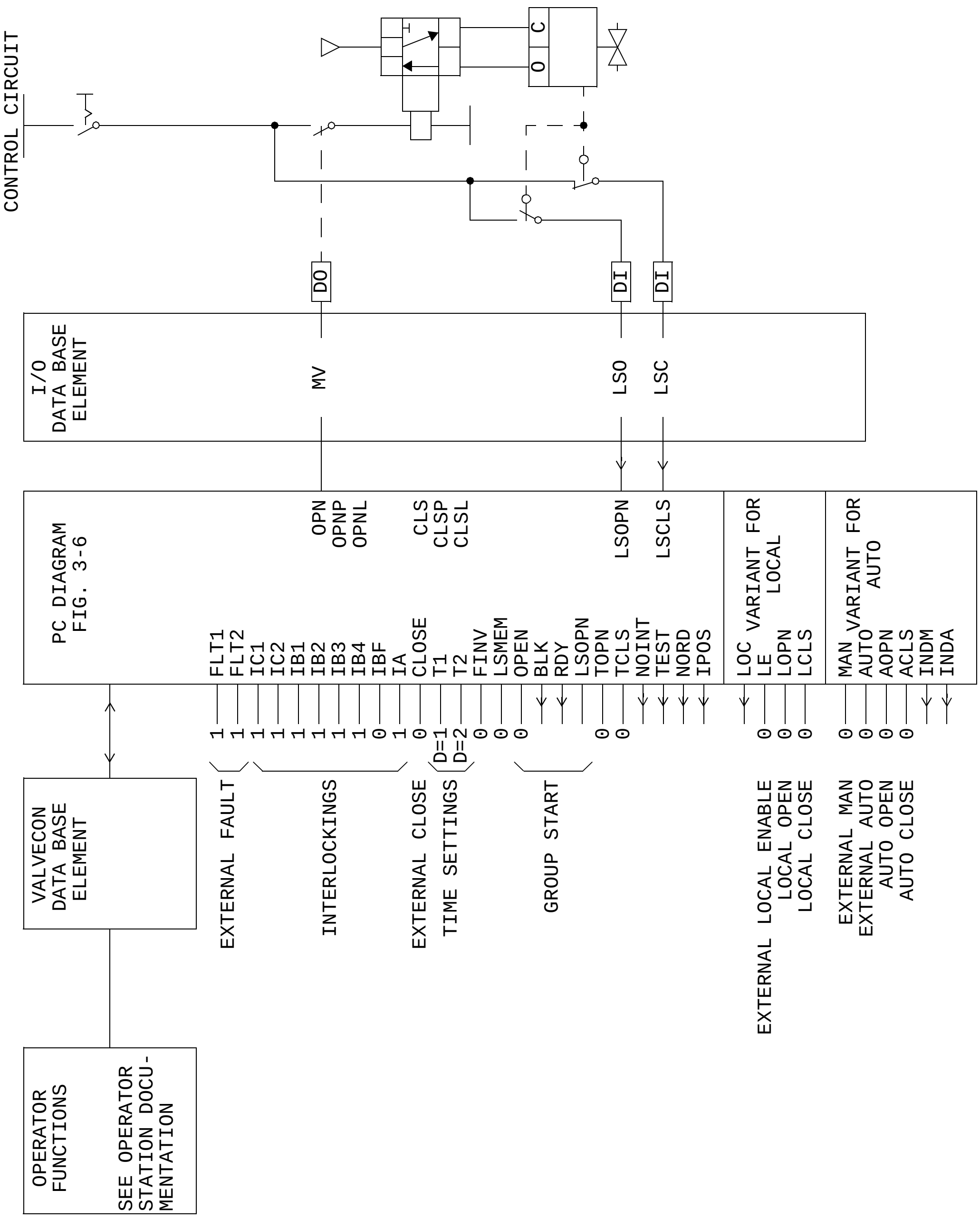


Figure 3-5. Overview diagram, Example 1

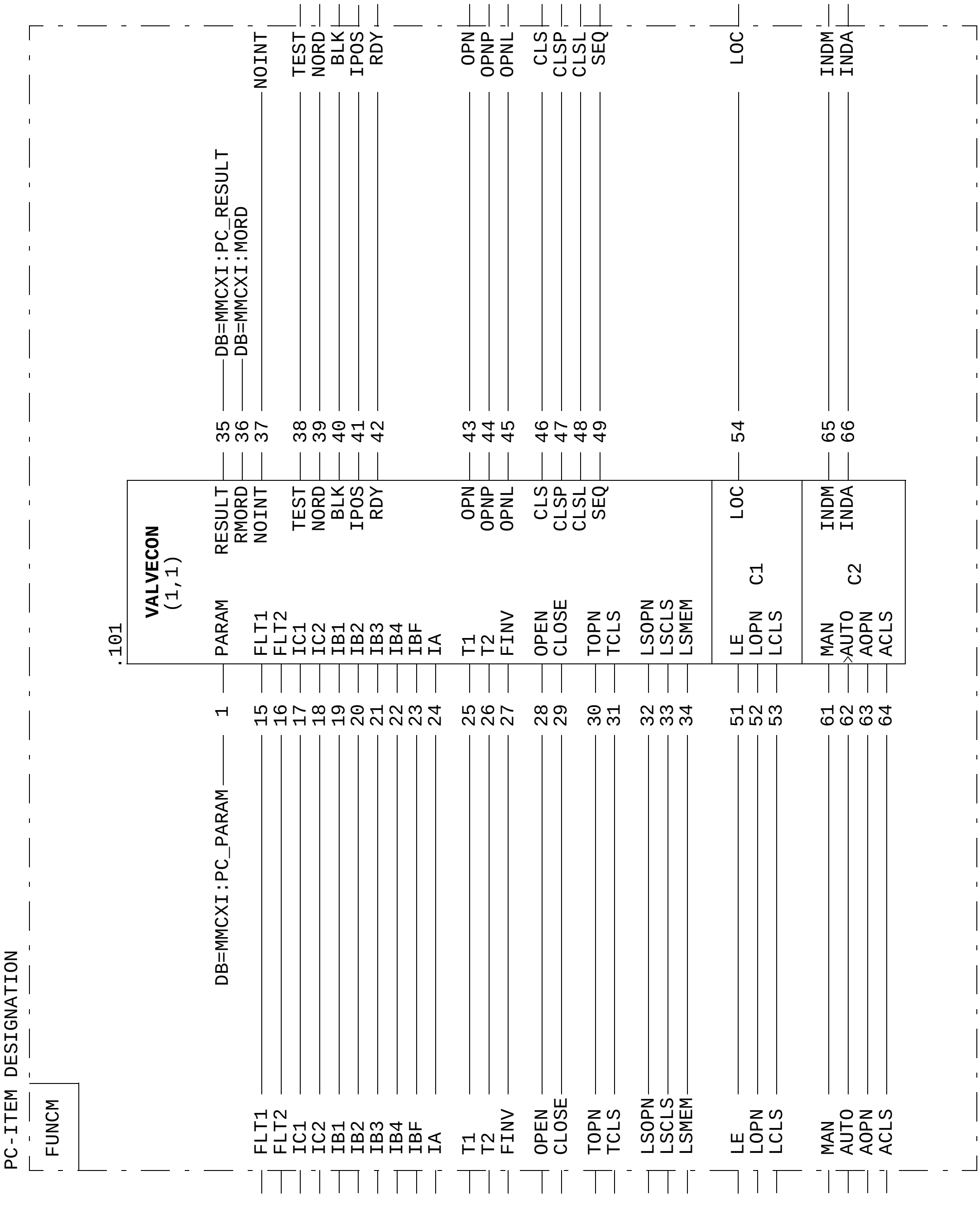


Figure 3-6. PC diagram, Example 1

3.6.2 Example 2

Description

On/off control of slave valve. The solution is completely based on the basic function of the VALVECON element. Only PC-inputs OPEN and CLOSE are avaiable for operation. All commands via the dialog are blocked in the data base. SEQUENCE is the only point of control.

Comments to the overview diagram

External Faults. Interlockings

If there are no interlockings, the interlocking inputs on the PC element are set to 1.

Time settings

These show suitable values at T1 and T2.

I/O Connections

DO MV is connected to, for example, the coil of a solenoid.

DI LSO is connected to a limit switch which indicates open valve.

DI LSC is connected to a limit switch which indicates closed valve.

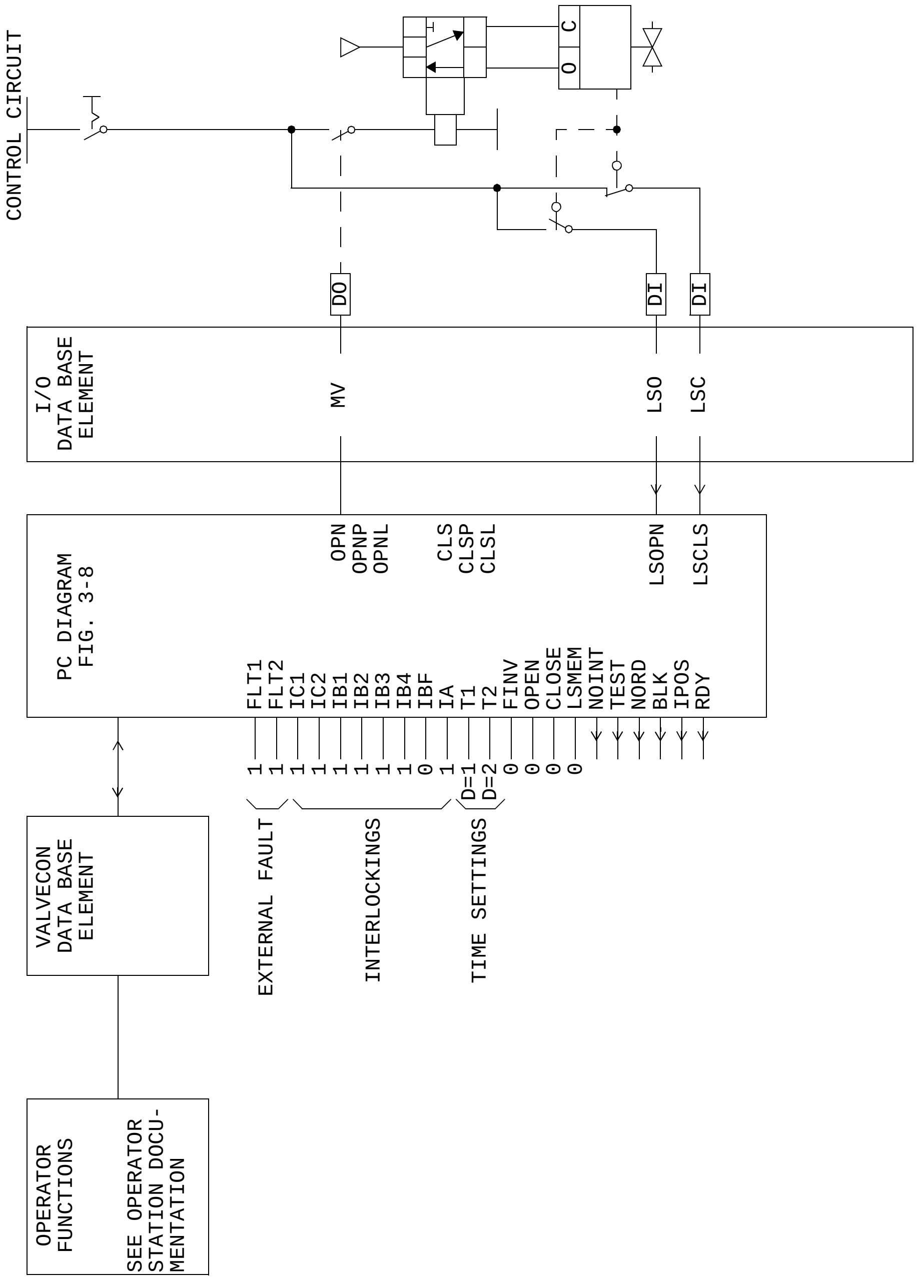


Figure 3-7. Overview diagram, Example 2

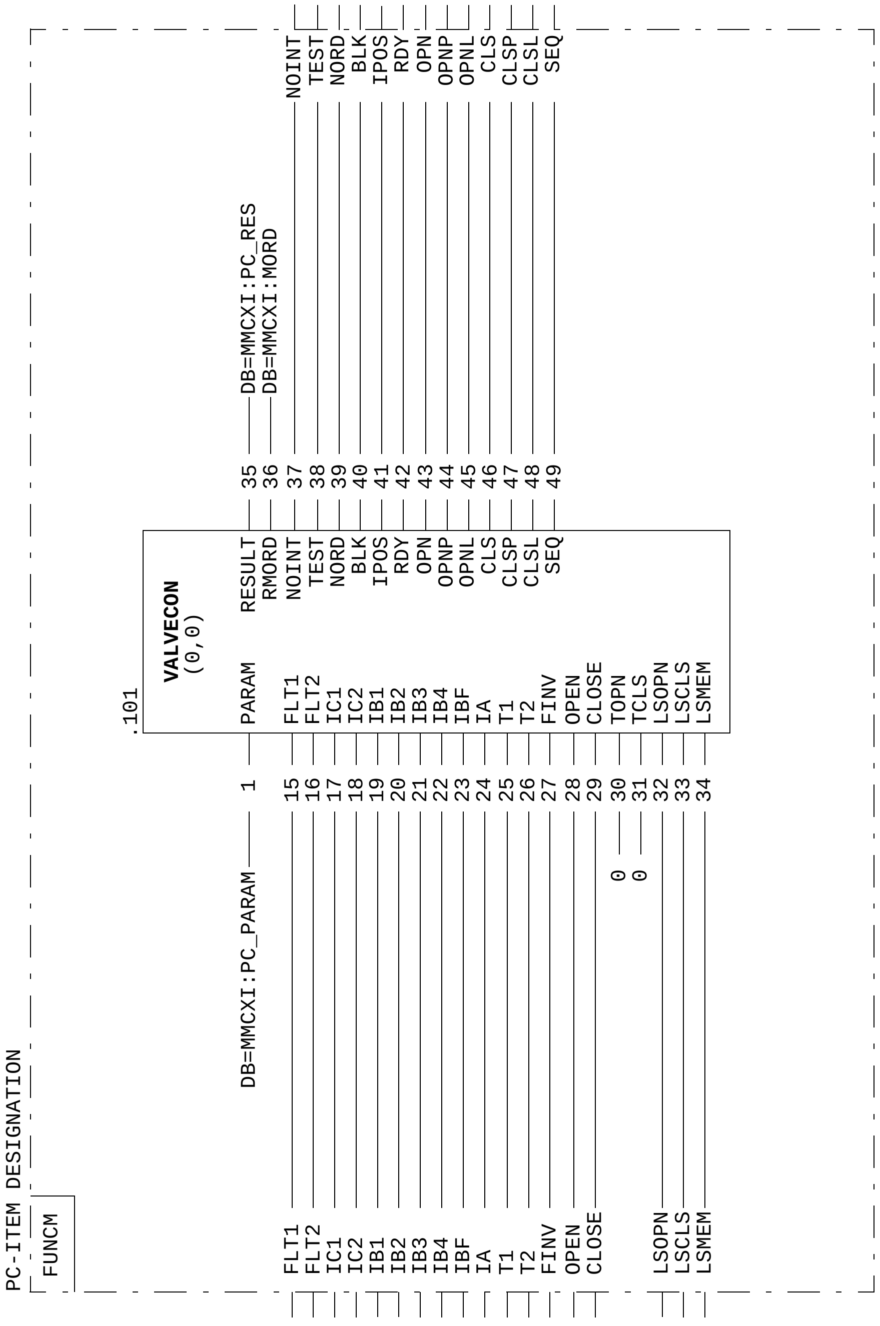


Figure 3-8. PC diagram, Example 2

3.7 Function diagram

The function diagram in section A.3 in appendix A describes in detail the logical relation between all input and output signals in the functional unit.

Appendix A Function Diagram

A.1 General

The function diagram describes in detail the relation between all input and output signals in the functional units. The figure below explains the used designations in the circuit diagram.

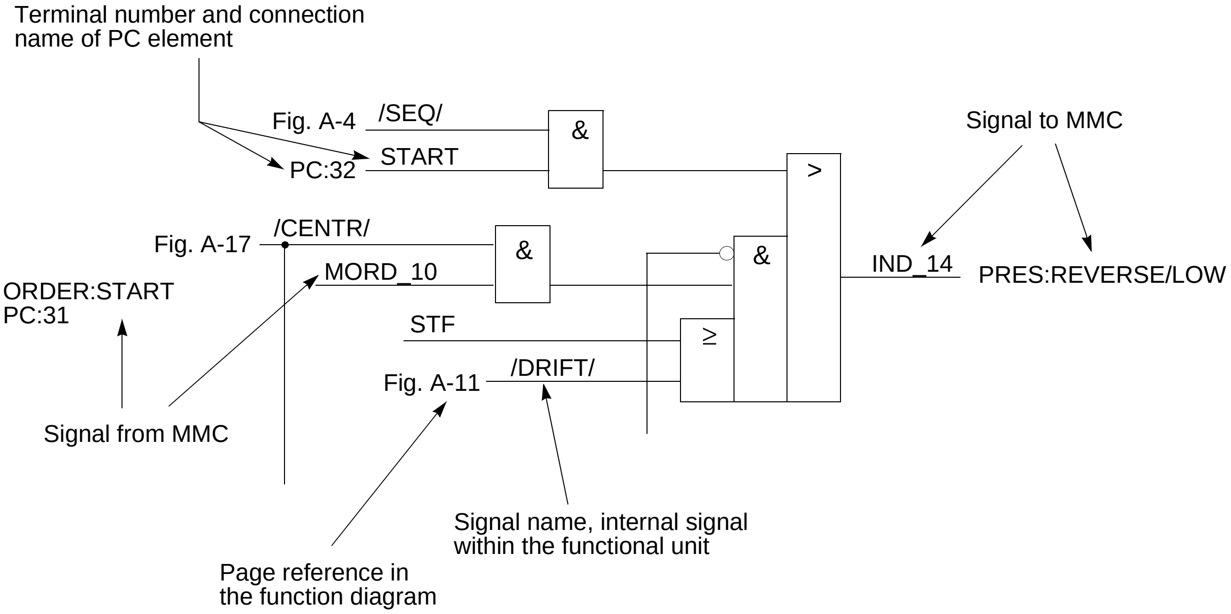

Terminal number and connection name of PC element
Fig. A-4
/SEQ/
START
PC:32
&
>
Signal to MMC
Fig. A-17
/CENTR/
MORD_10
&
&
IND_14
PRES:REVERSE/LOW
ORDER:START
PC:31
STF
≥
Fig. A-11
/DRIFT/
Signal from MMC
Signal name, internal signal within the functional unit
Page reference in the function diagram

Figure A-1. Designations in the function diagram

A.2 MOTCON

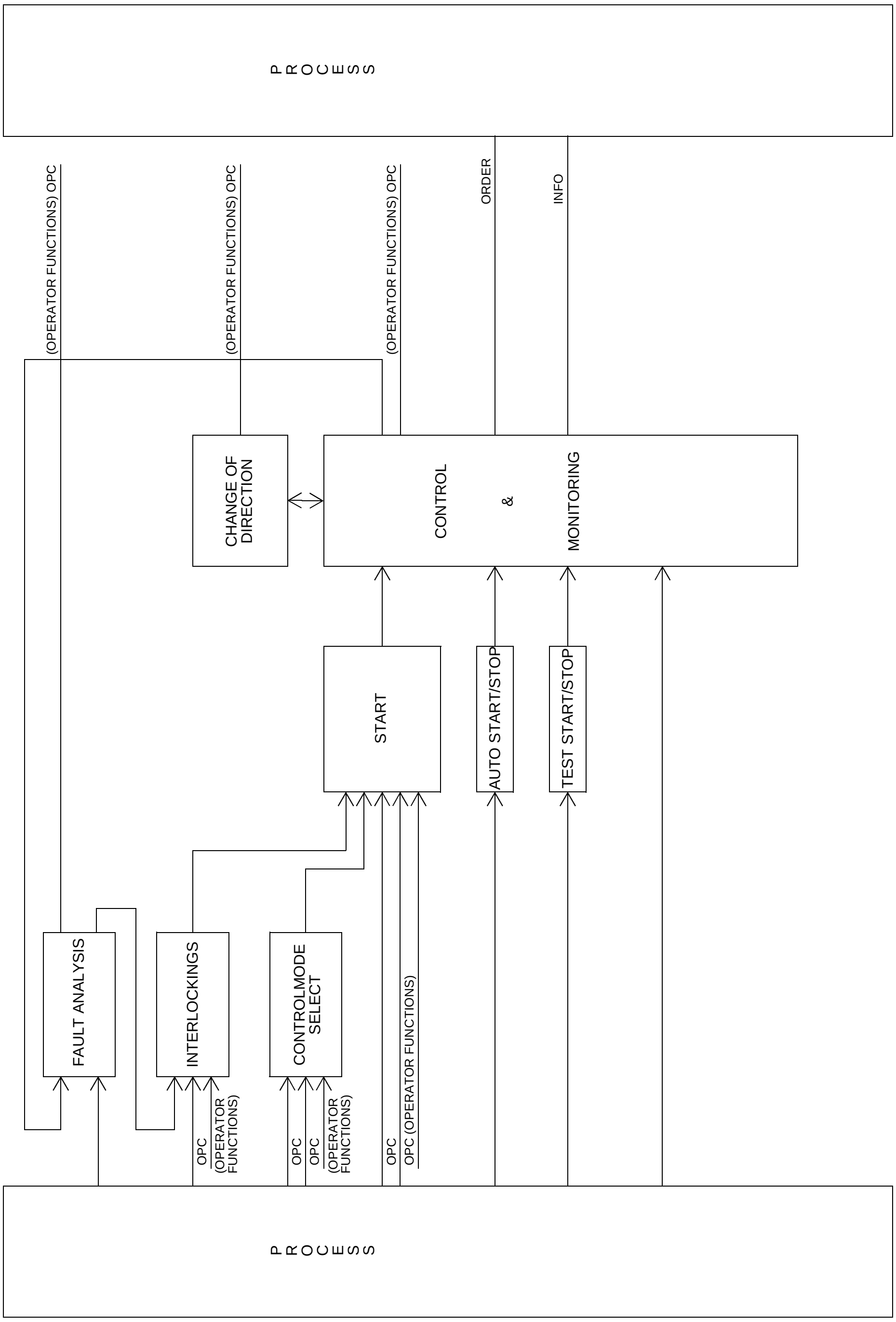


Figure A-2. Block diagram

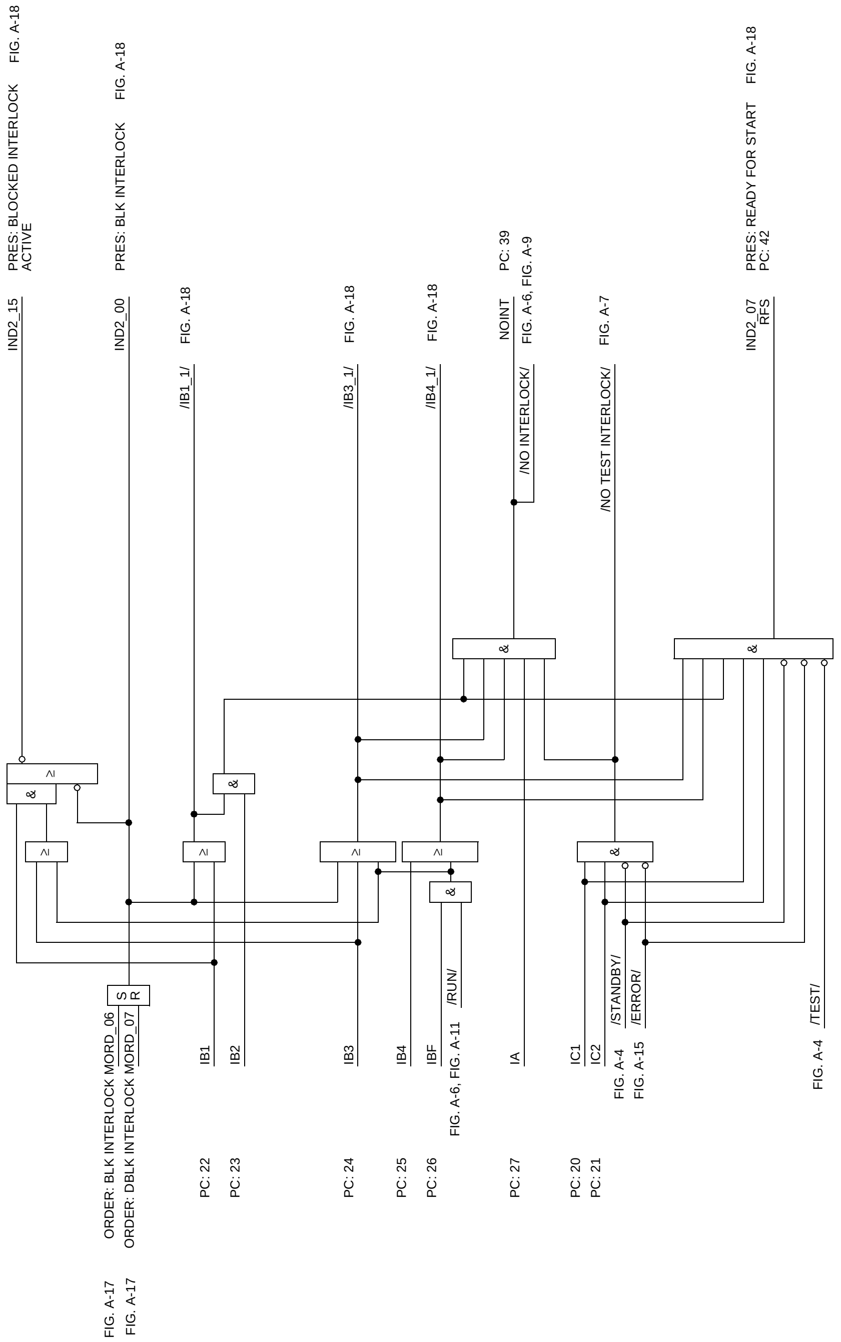


Figure A-3. Interlockings

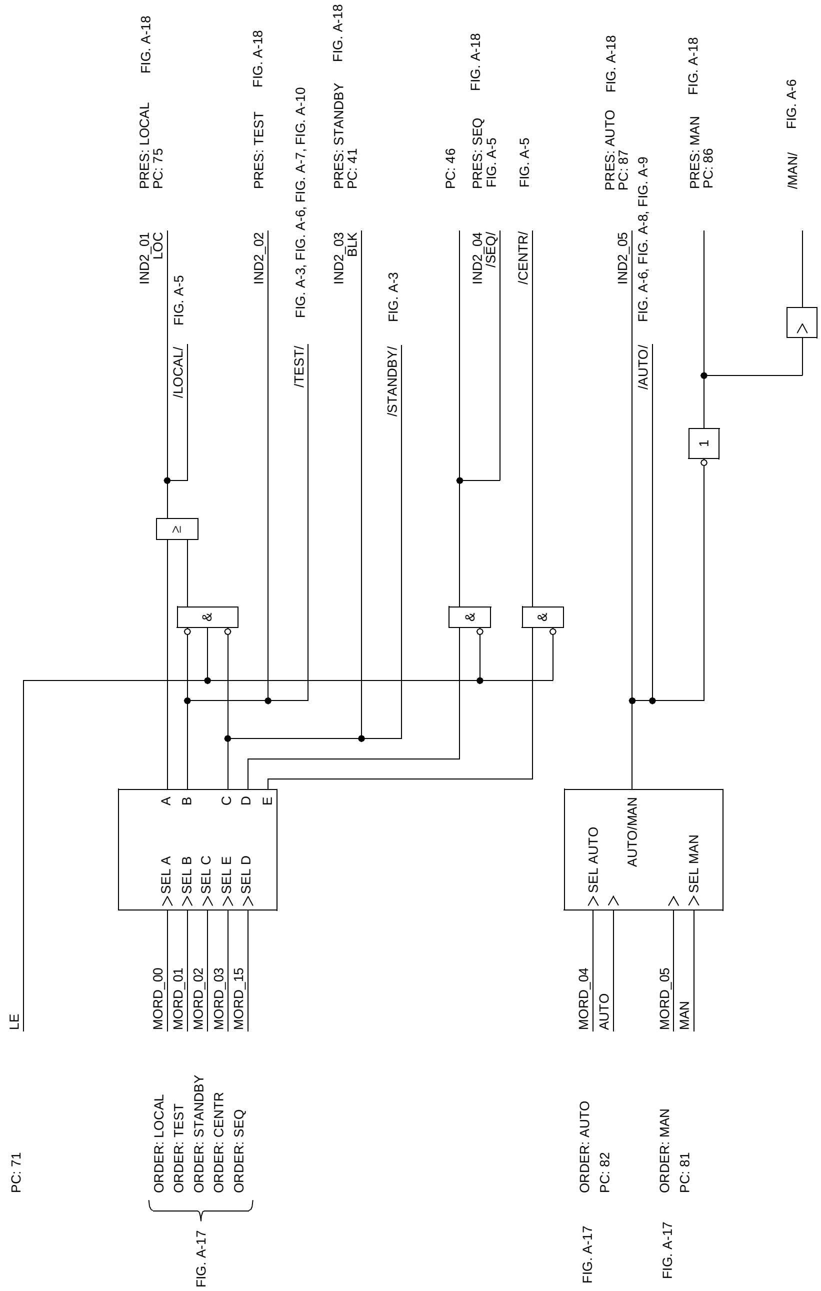


Figure A-4. Change of control mode

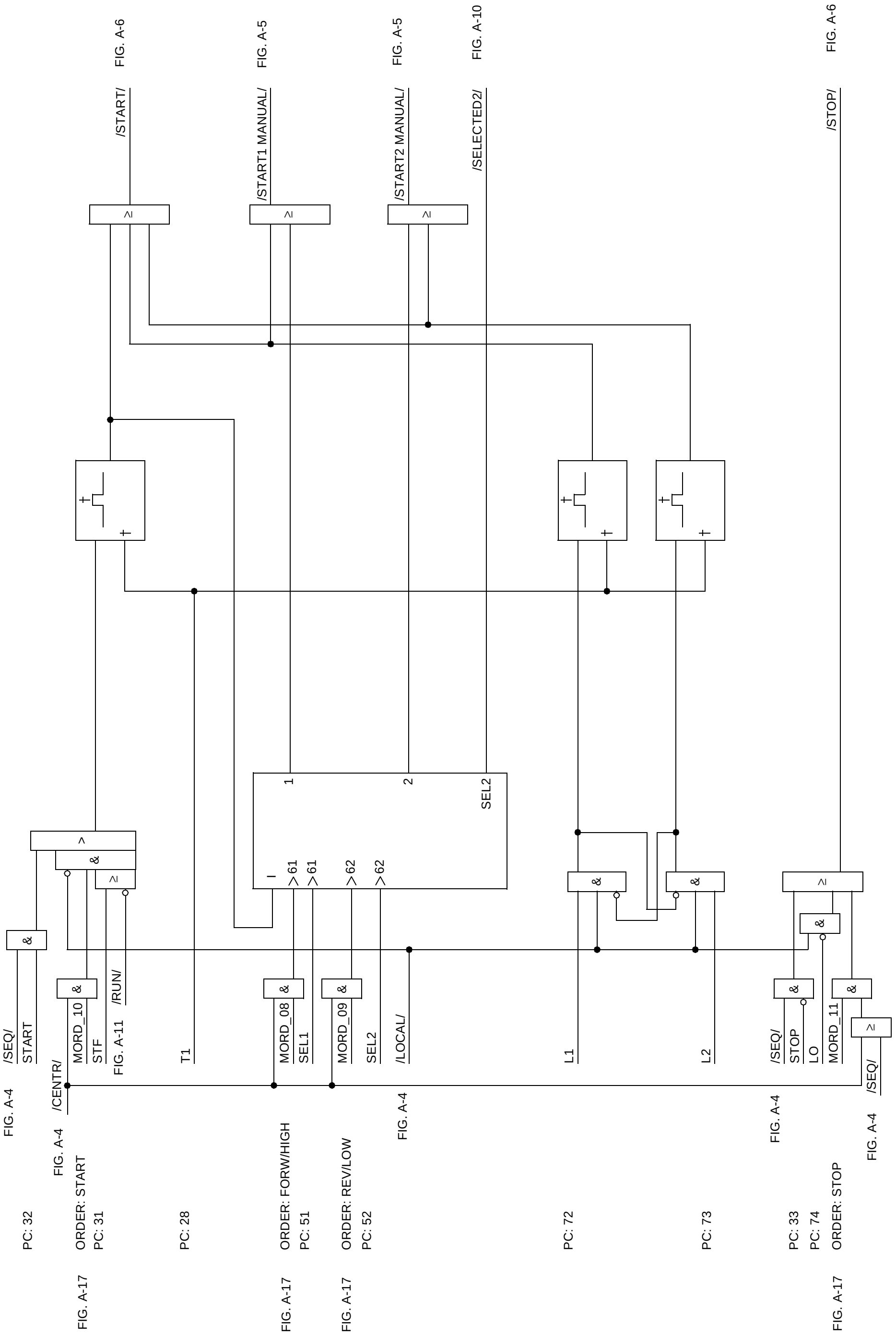


Figure A-5. Start and stop

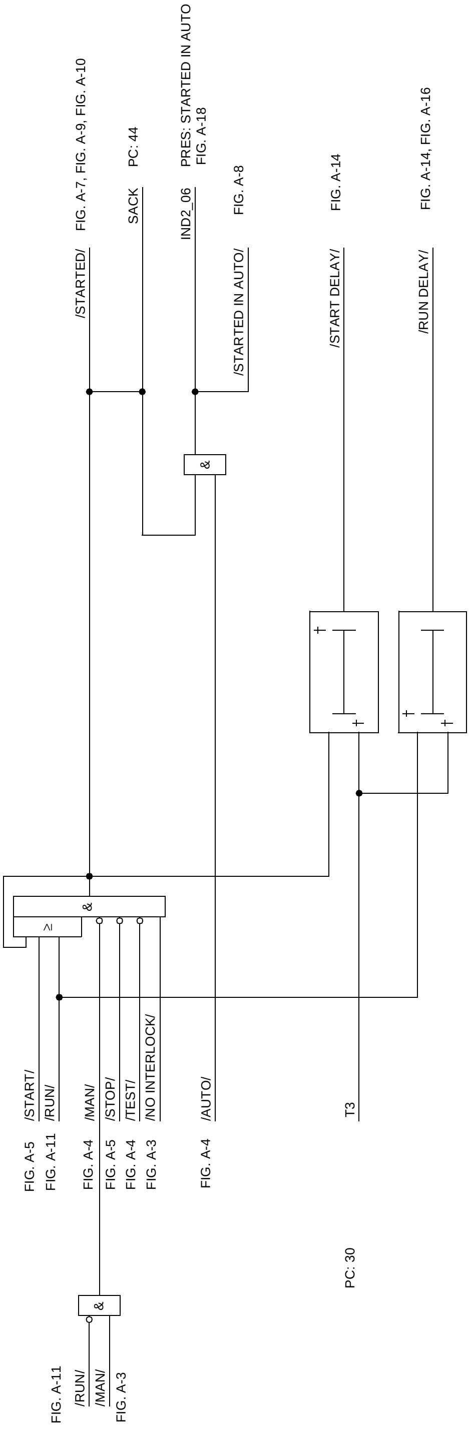


Figure A-6. Memorizing start

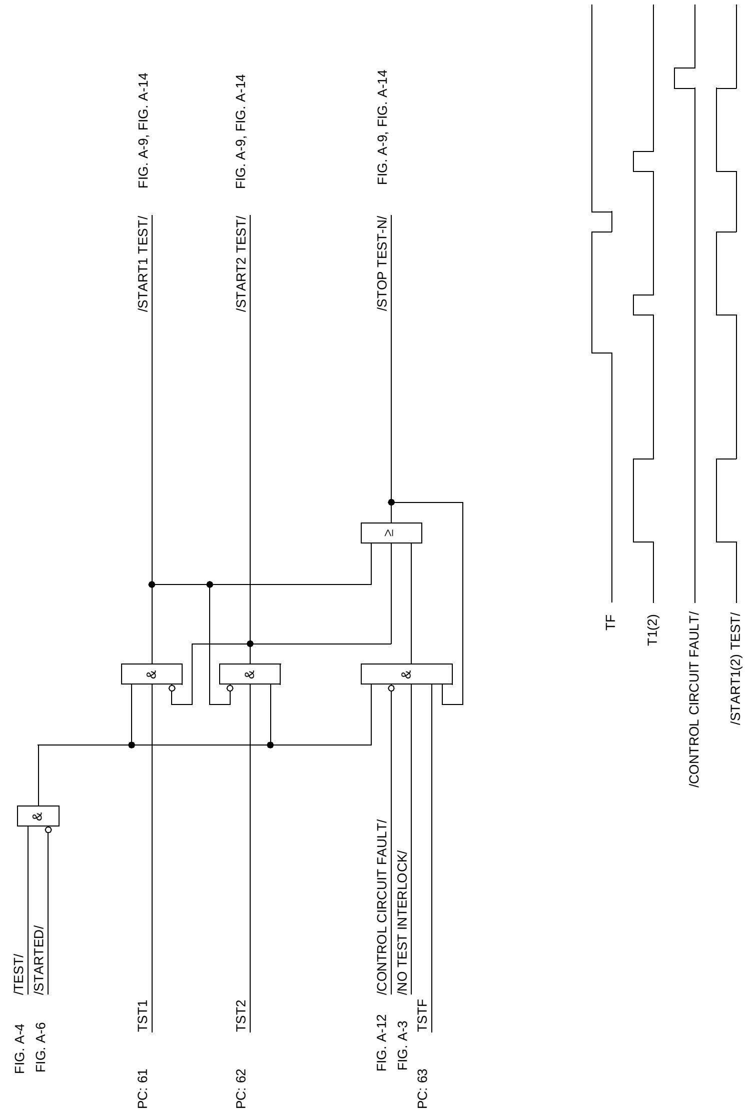


Figure A-7. Test mode

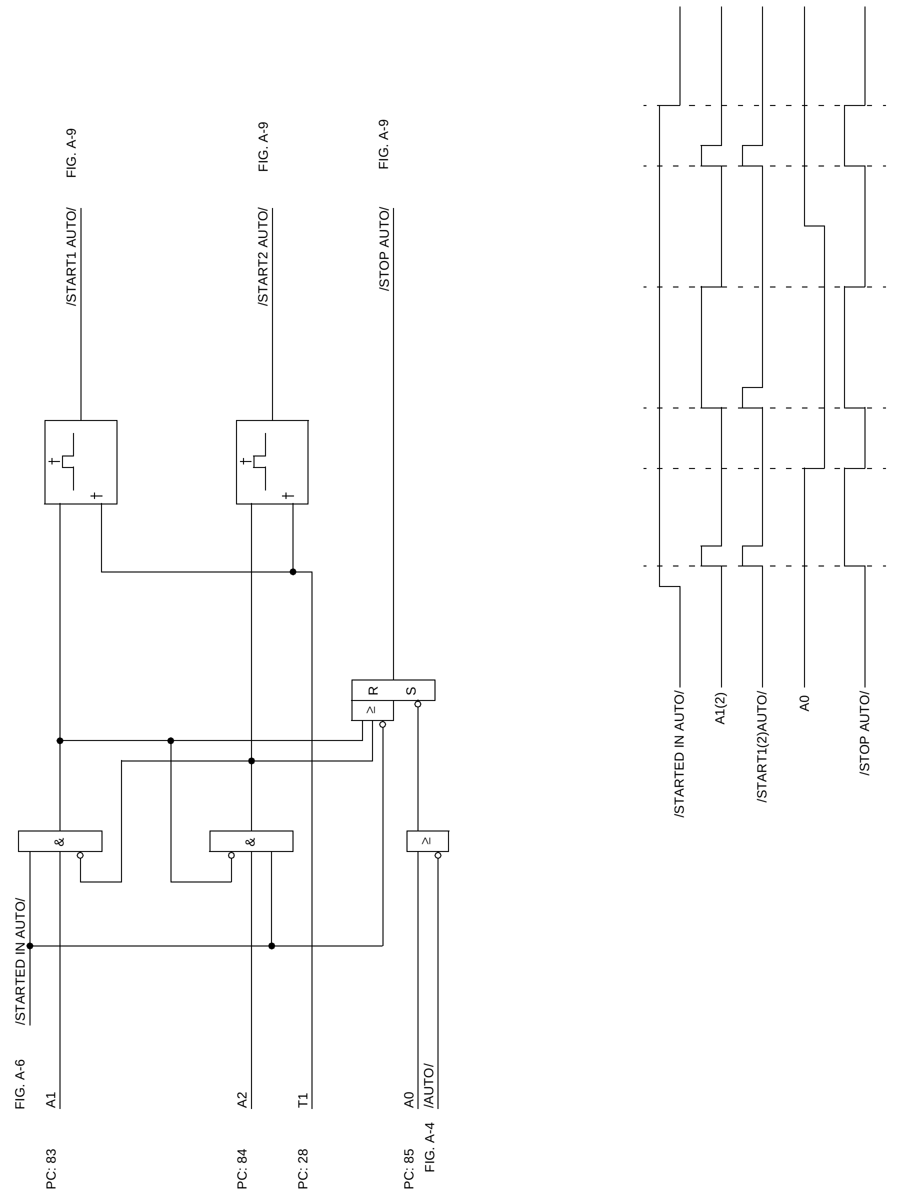


Figure A-8. Auto mode

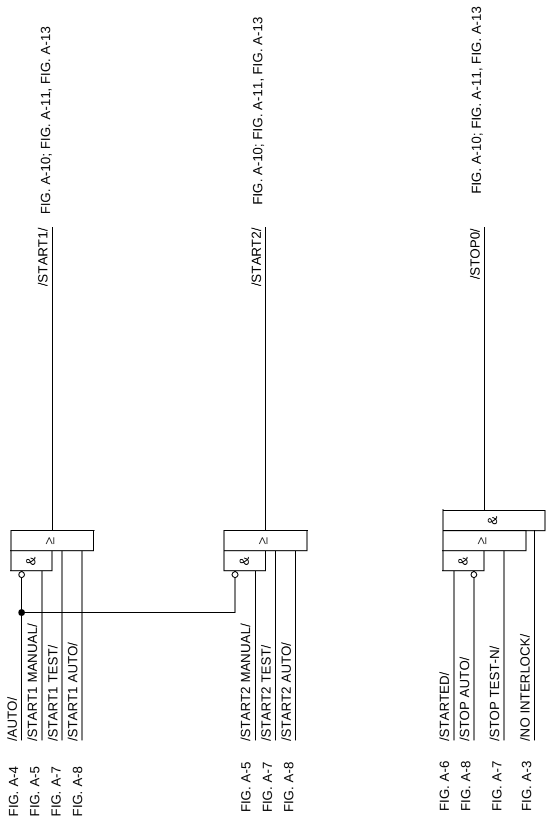


Figure A-9. Choise of start order

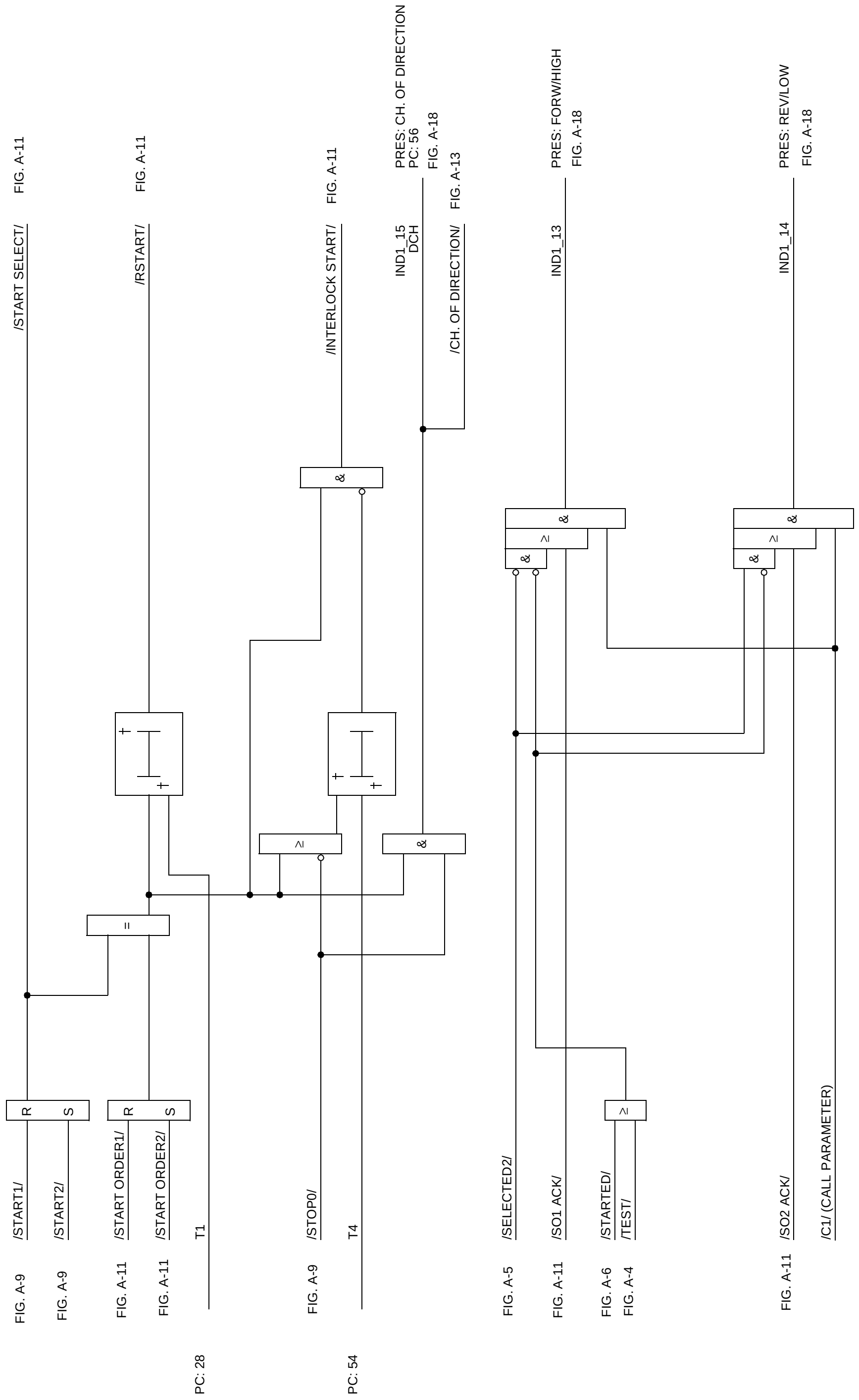


Figure A-10. Change of position / Presentation of position

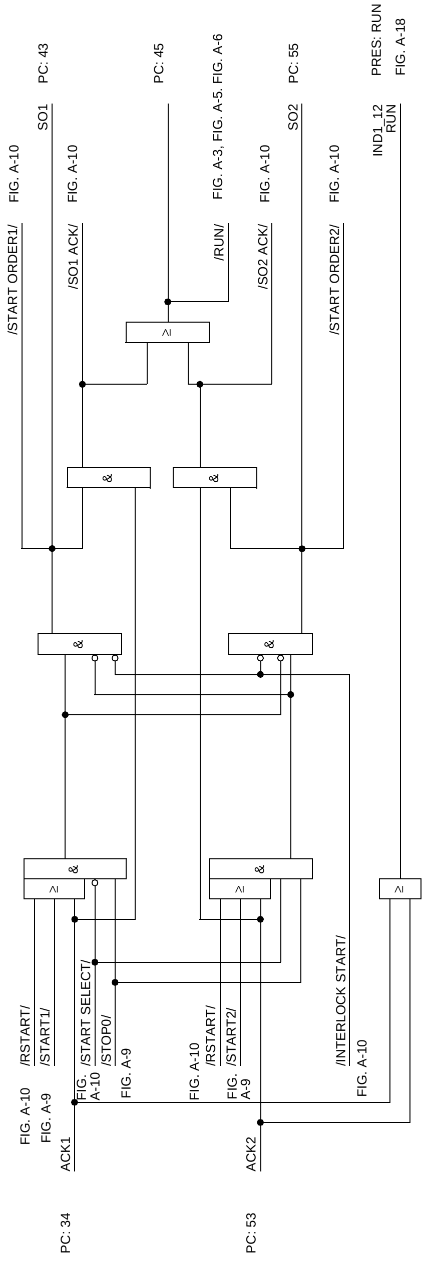


Figure A-11. Start order

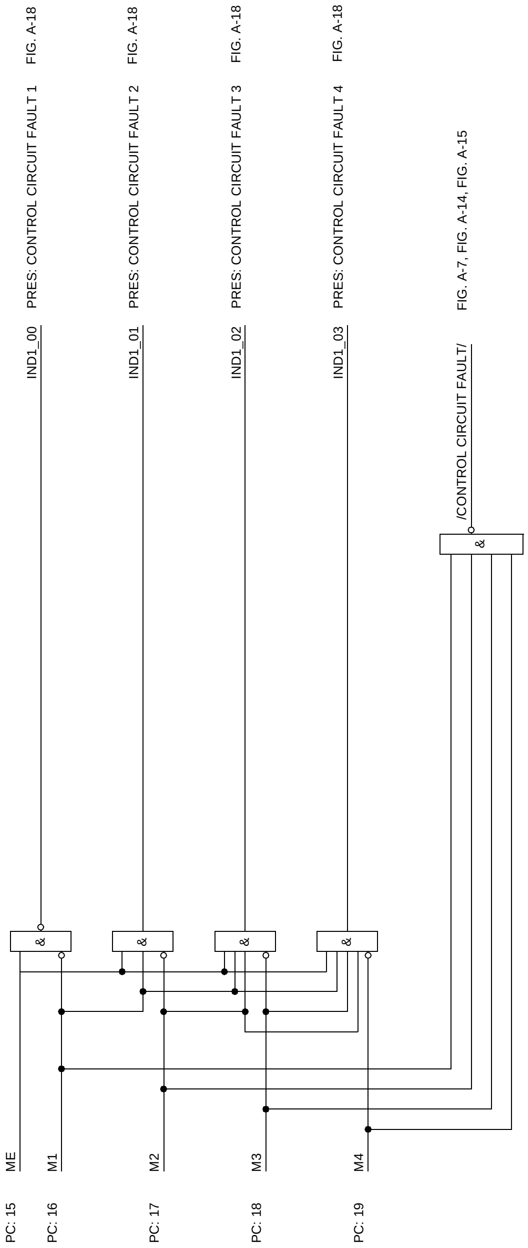


FIG. A-18
PRES: CONTROL CIRCUIT FAULT 1
IND1_00
FIG. A-18
PRES: CONTROL CIRCUIT FAULT 2
IND1_01
FIG. A-18
PRES: CONTROL CIRCUIT FAULT 3
IND1_02
FIG. A-18
PRES: CONTROL CIRCUIT FAULT 4
IND1_03
FIG. A-7, FIG. A-14, FIG. A-15
/CONTROL CIRCUIT FAULT/
&
&
&
&
&
ME
M1
M2
M3
M4
PC: 15
PC: 16
PC: 17
PC: 18
PC: 19

Figure A-12. Fault handling

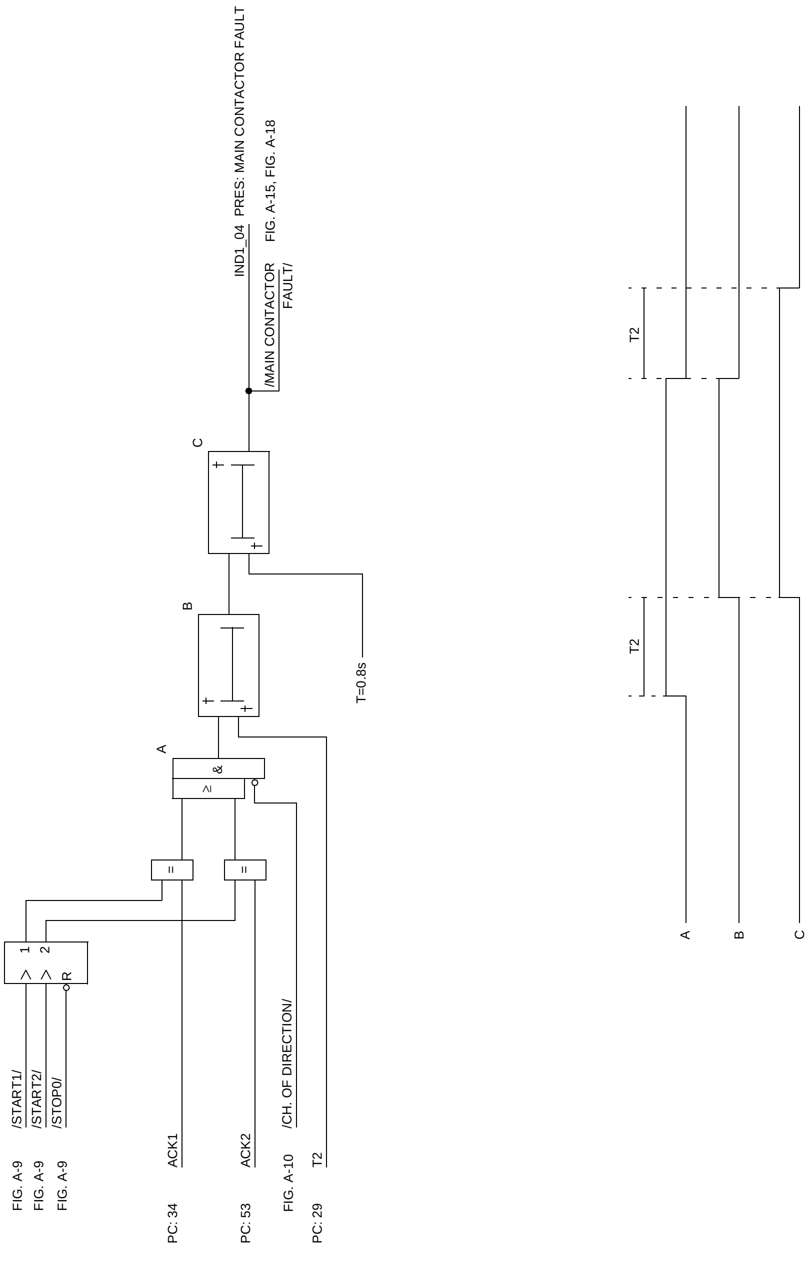


Figure A-13. Contactor control

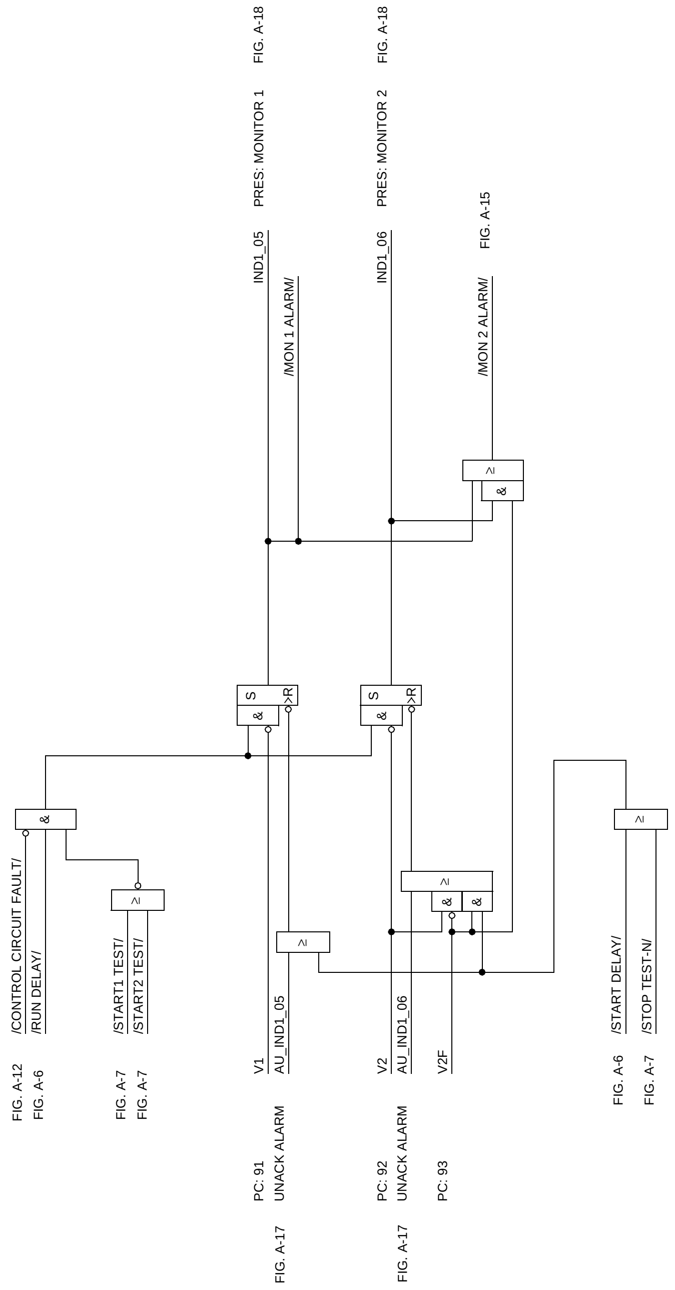


Figure A-14. Monitor Low/High

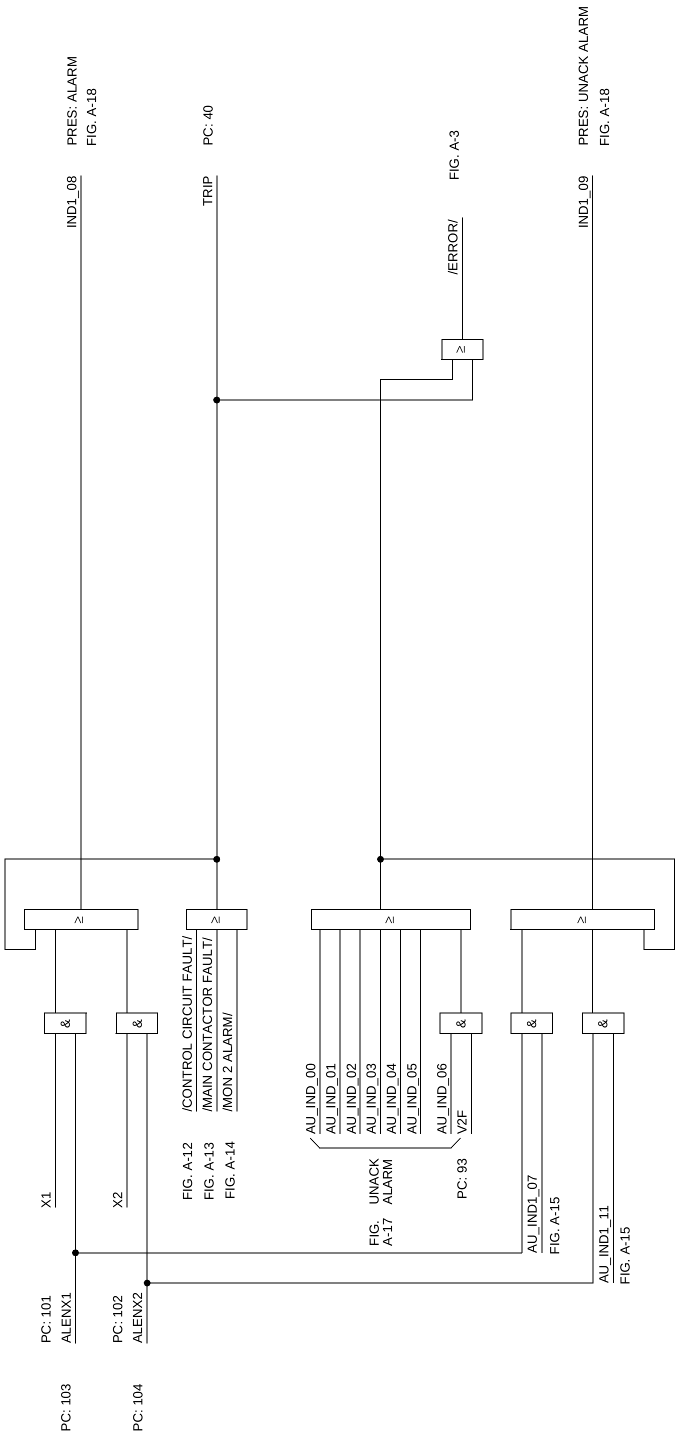


Figure A-15. Alarm

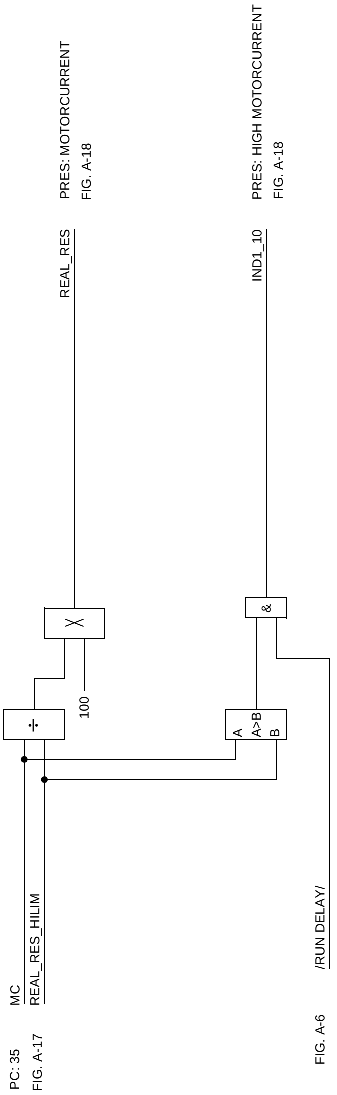


Figure A-16. Check on motor current

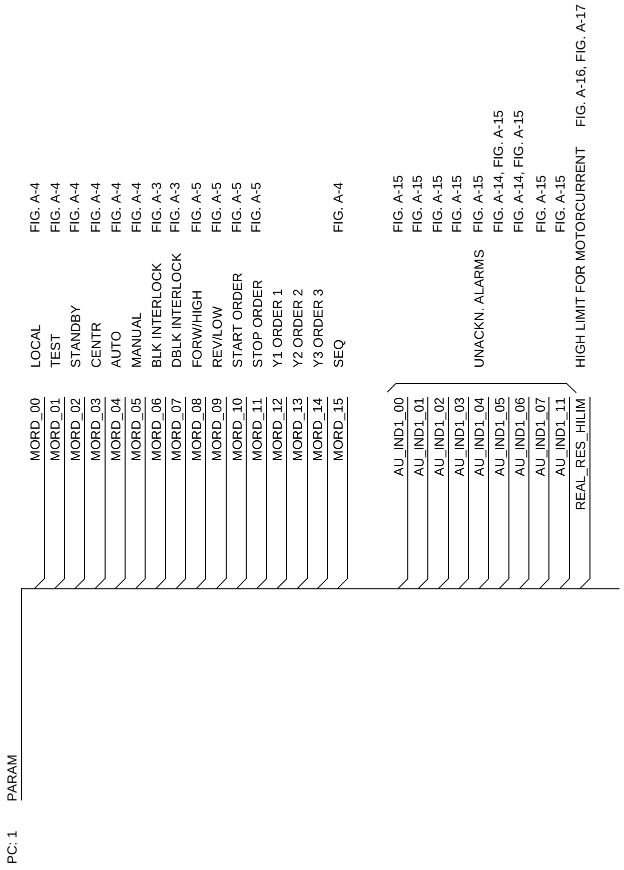


Figure A-17. Order from operator

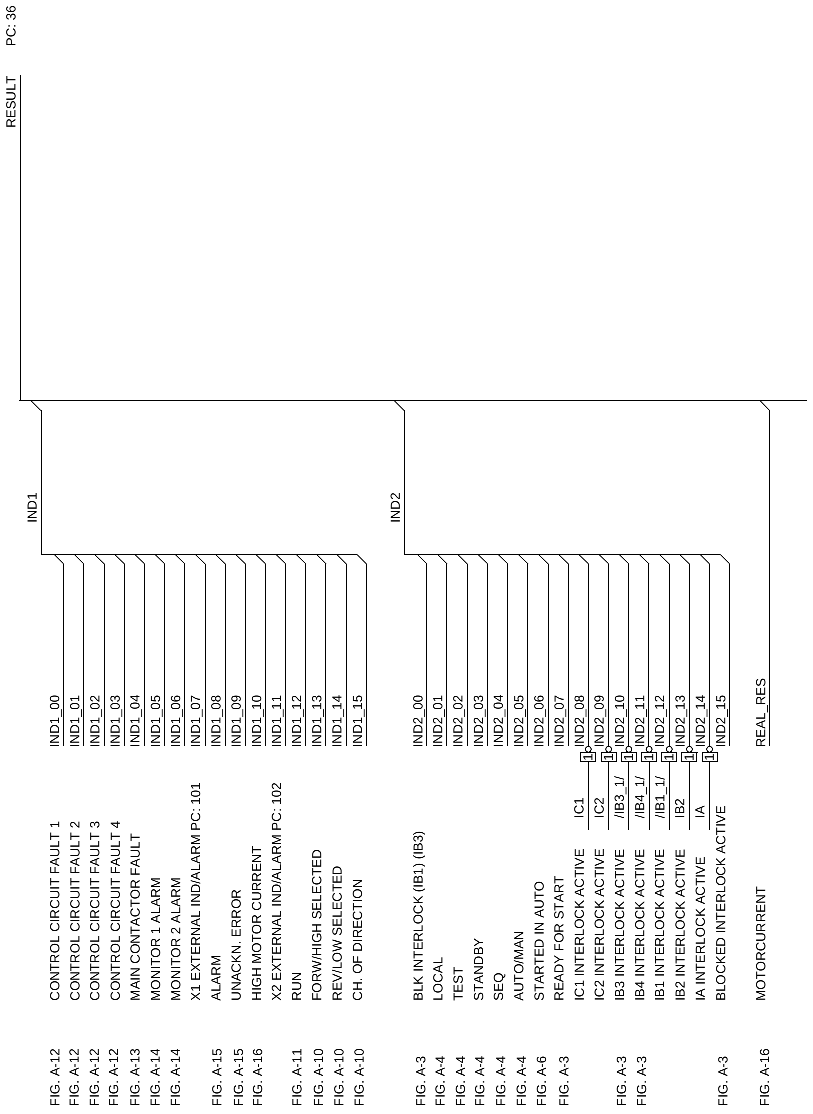

RESULT
PC: 36
IND1
IND2
FIG. A-12 CONTROL CIRCUIT FAULT 1 IND1_00
FIG. A-12 CONTROL CIRCUIT FAULT 2 IND1_01
FIG. A-12 CONTROL CIRCUIT FAULT 3 IND1_02
FIG. A-12 CONTROL CIRCUIT FAULT 4 IND1_03
FIG. A-13 MAIN CONTACTOR FAULT IND1_04
FIG. A-14 MONITOR 1 ALARM IND1_05
FIG. A-14 MONITOR 2 ALARM IND1_06
X1 EXTERNAL IND/ALARM PC: 101 IND1_07
FIG. A-15 ALARM IND1_08
FIG. A-15 UNACKN. ERROR IND1_09
FIG. A-16 HIGH MOTOR CURRENT IND1_10
X2 EXTERNAL IND/ALARM PC: 102 IND1_11
FIG. A-11 RUN IND1_12
FIG. A-10 FORW/HIGH SELECTED IND1_13
FIG. A-10 REV/LOW SELECTED IND1_14
FIG. A-10 CH. OF DIRECTION IND1_15
FIG. A-3 BLK INTERLOCK (IB1) (IB3) IND2_00
FIG. A-4 LOCAL IND2_01
FIG. A-4 TEST IND2_02
FIG. A-4 STANDBY IND2_03
FIG. A-4 SEQ IND2_04
FIG. A-4 AUTO/MAN IND2_05
FIG. A-6 STARTED IN AUTO IND2_06
FIG. A-3 READY FOR START IND2_07
IC1 INTERLOCK ACTIVE IC1 1 IND2_08
IC2 INTERLOCK ACTIVE IC2 1 IND2_09
FIG. A-3 IB3 INTERLOCK ACTIVE /IB3_1/ 1 IND2_10
FIG. A-3 IB4 INTERLOCK ACTIVE /IB4_1/ 1 IND2_11
IB1 INTERLOCK ACTIVE /IB1_1/ 1 IND2_12
IB2 INTERLOCK ACTIVE IB2 1 IND2_13
IA INTERLOCK ACTIVE IA 1 IND2_14
FIG. A-3 BLOCKED INTERLOCK ACTIVE IND2_15
FIG. A-16 MOTORCURRENT REAL_RES

Figure A-18. Result

A.3 VALVECON

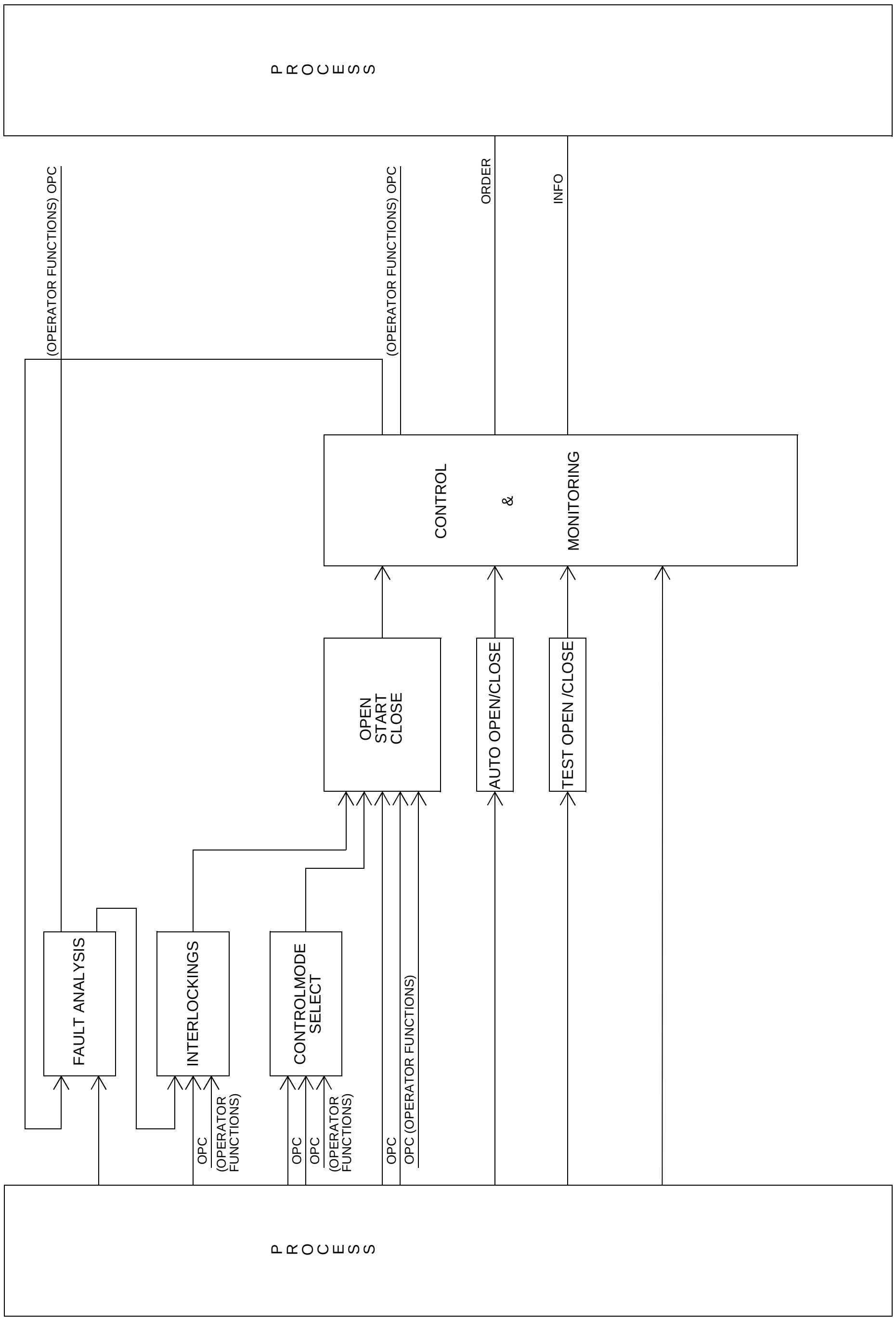


Figure A-19. Block diagram

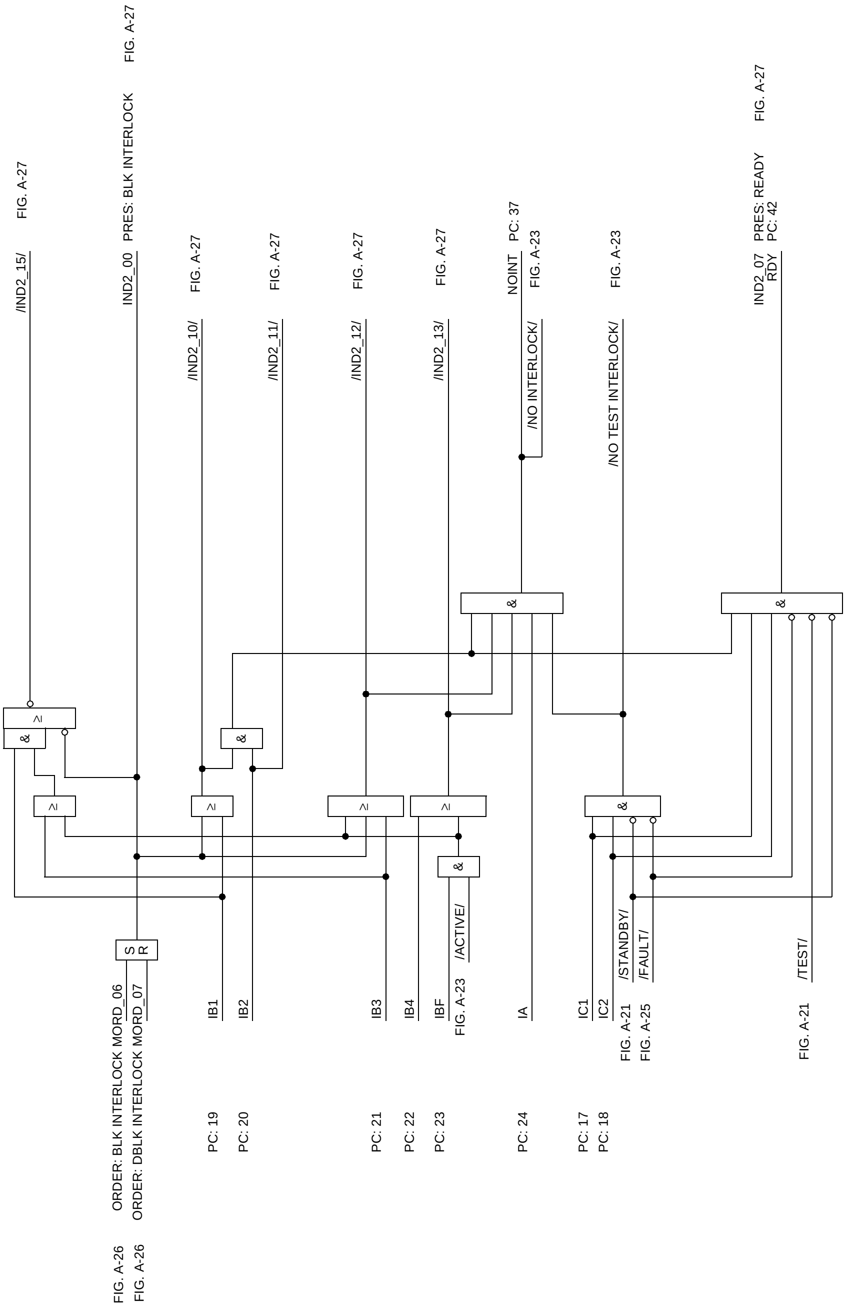


Figure A-20. Interlockings

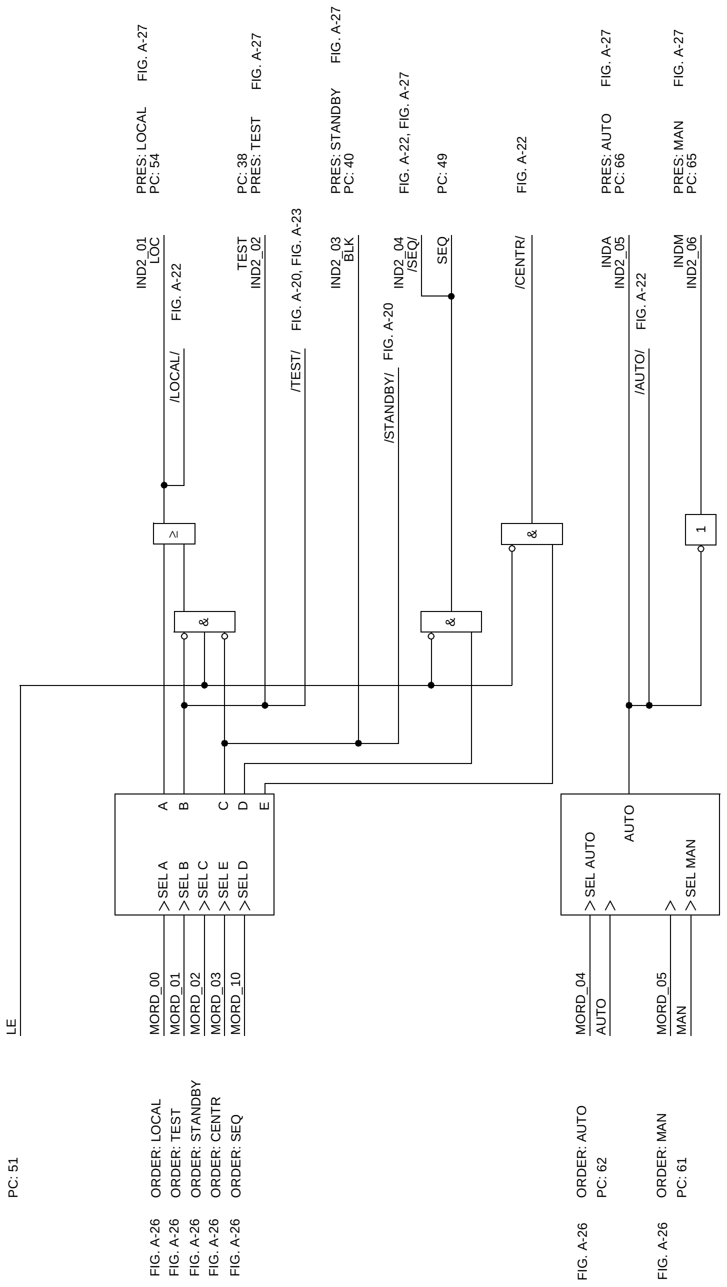


Figure A-21. Change of control mode

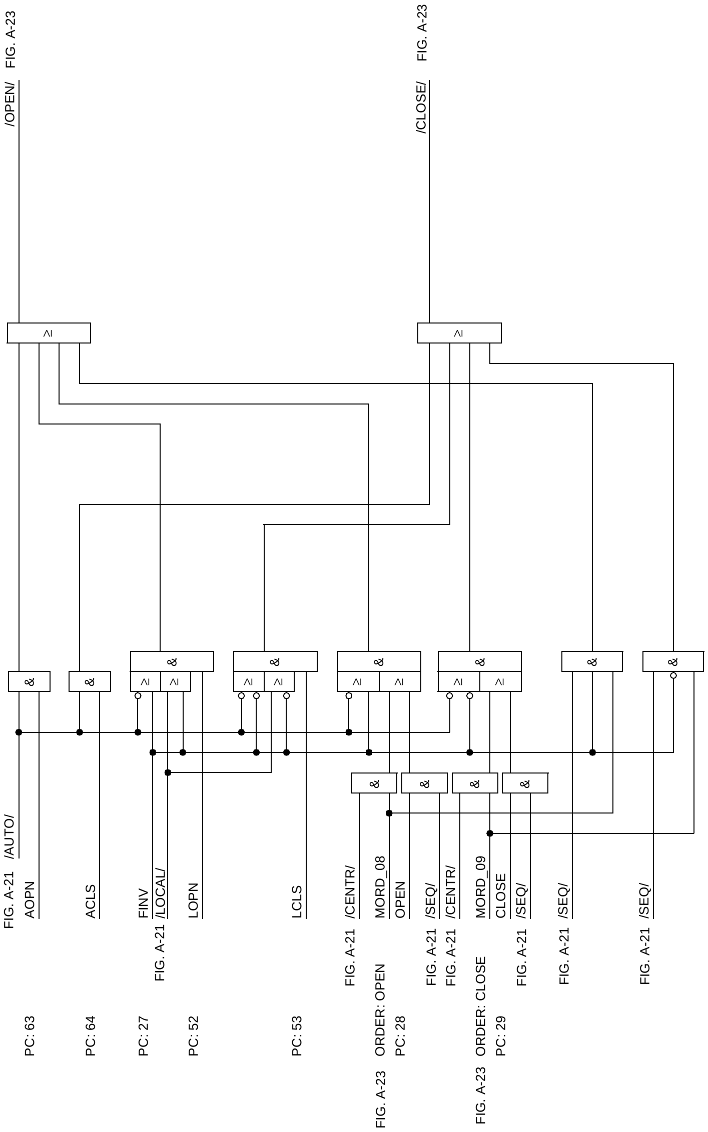


Figure A-22. Control

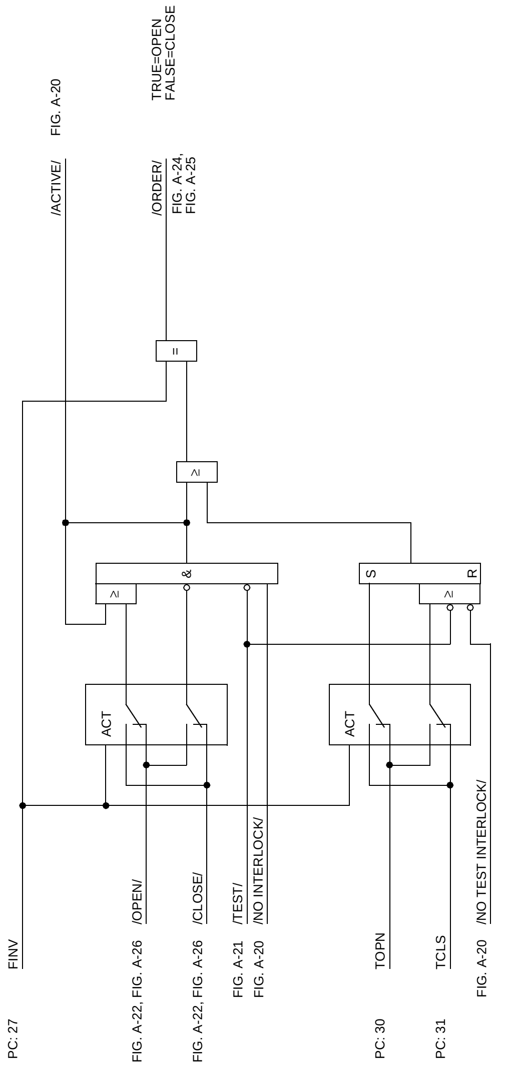


Figure A-23. Memorizing start

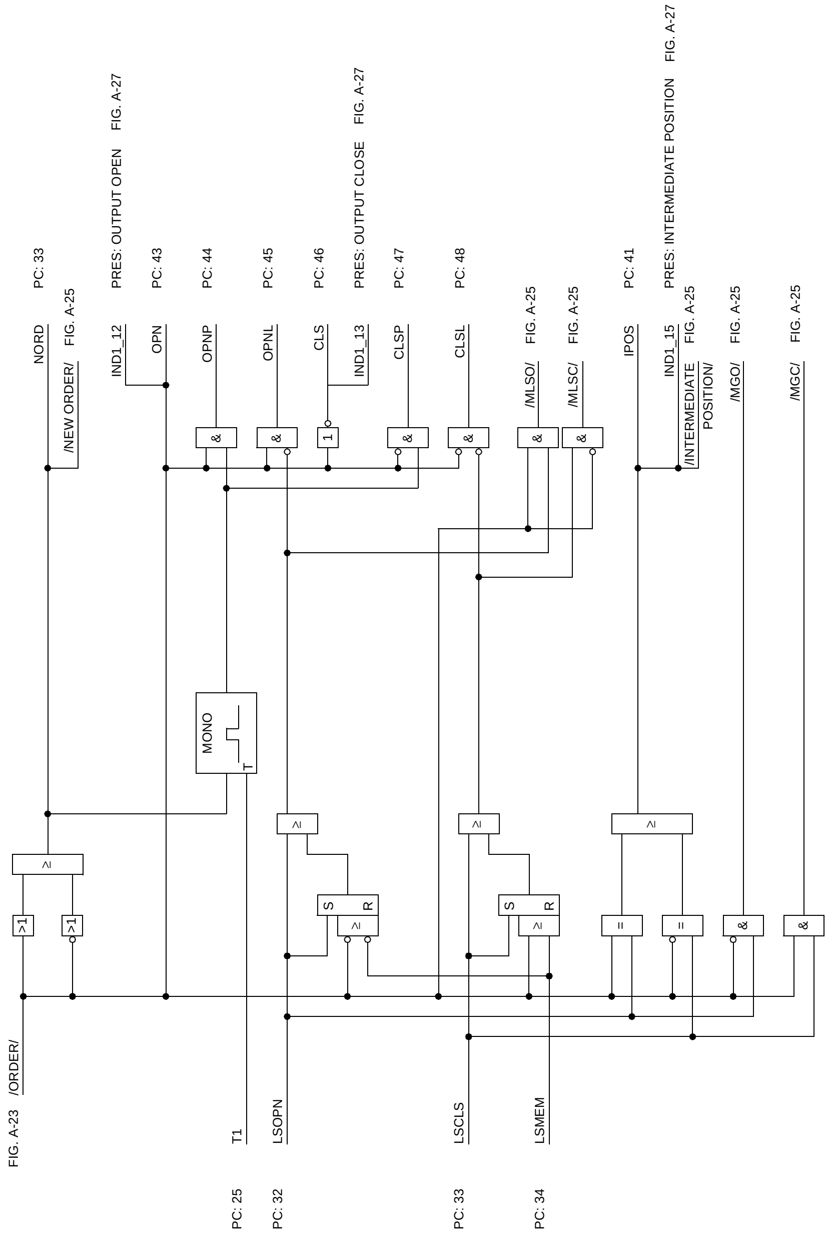


Figure A-24. Order, Position

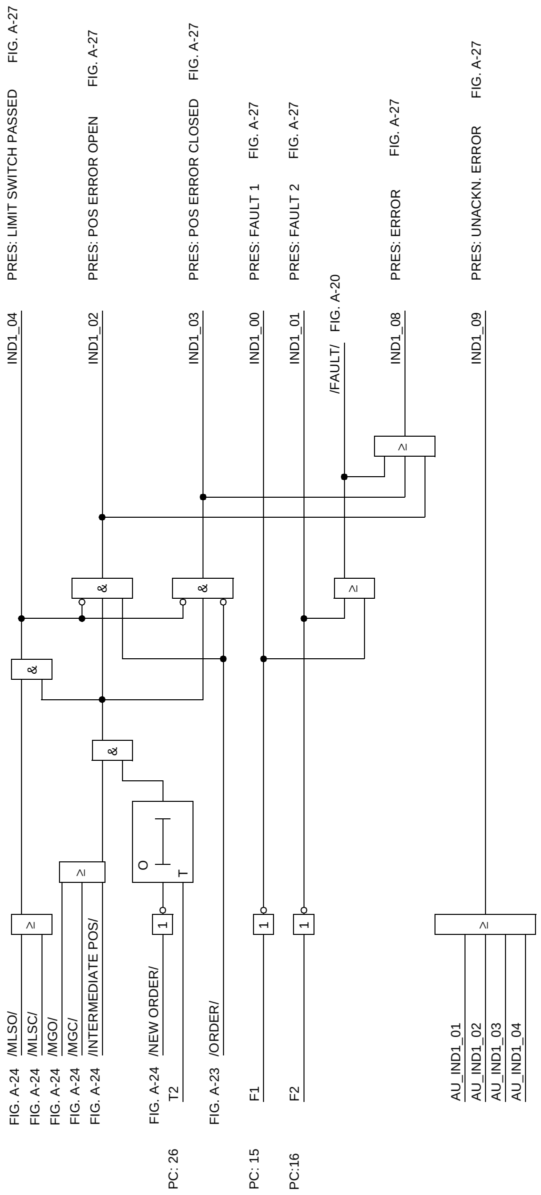


FIG. A-24 /MLSO/
FIG. A-24 /MLSC/
FIG. A-24 /MGO/
FIG. A-24 /MGC/
FIG. A-24 /INTERMEDIATE POS/
FIG. A-24 /NEW ORDER/
PC: 26 T2
FIG. A-23 /ORDER/
PC: 15 F1
PC:16 F2
AU_IND1_01
AU_IND1_02
AU_IND1_03
AU_IND1_04
≥
&
O
T
1
IND1_04 PRES: LIMIT SWITCH PASSED FIG. A-27
IND1_02 PRES: POS ERROR OPEN FIG. A-27
IND1_03 PRES: POS ERROR CLOSED FIG. A-27
IND1_00 PRES: FAULT 1 FIG. A-27
IND1_01 PRES: FAULT 2 FIG. A-27
/FAULT/ FIG. A-20
IND1_08 PRES: ERROR FIG. A-27
IND1_09 PRES: UNACKN. ERROR FIG. A-27

Figure A-25. External error

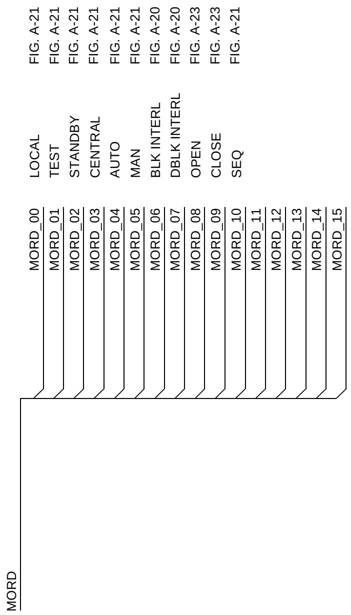


Figure A-26. Order

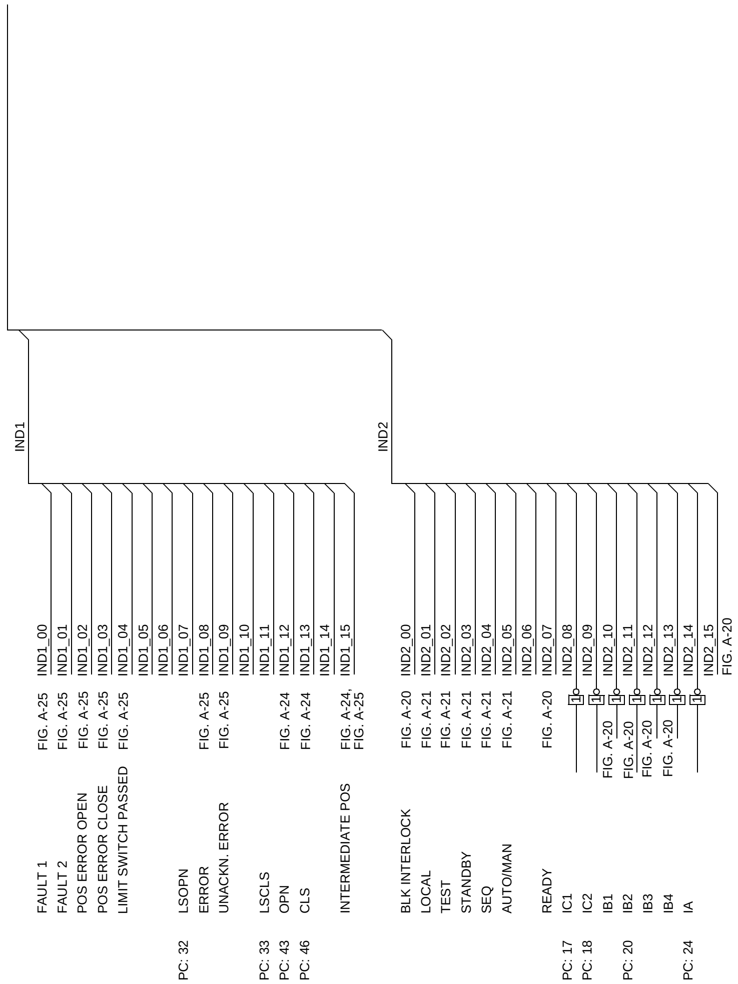


Figure A-27. Indications

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March 1996